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THE  
BRITISH PHARMACEUTICAL  
CODEX

AN IMPERIAL DISPENSATORY  
FOR THE USE OF  
MEDICAL PRACTITIONERS AND PHARMACISTS



By Authority of the Council  
OF THE  
Pharmaceutical Society of Great Britain

Published by the Pharmaceutical Society  
AT  
72, GREAT RUSSELL STREET, LONDON, W.C.

1907



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# British Pharmaceutical Codex, 1907

## CORRIGENDA.

A few errors and omissions have been noted since the sheets were passed for press, and the following corrections should be indicated on the respective pages:—

Page	34,	line	4;	for "sufficient to produce 100" read "a sufficient quantity."	✓
"	45,	"	27;	for "acetyl-salicyic" read "acetyl salicylic."	✓
"	53,	"	21;	delete the whole line.	✓
"	115,	"	29;	for " <i>Androsæfolium</i> " read " <i>Androsæmifolium</i> ."	✓
"	183,	"	23;	for "bromides" read "chlorides."	✓
"	212,	"	26;	delete the reference to glycerin.	✓
"	242,	"	2;	for "cevidine" read "cevedine."	✓
"	273,	"	23;	for "ether" read "purified ether."	✓
"	320,	"	27;	after "Dose" add "of liquid extract."	✓
"	360,	"	29;	for "A" read "Erythrophlœol, a."	✓
"	378,	"	47;	for "solution of potash" read "potassium hydroxide."	✓
"	384,	"	6;	for "total alkaloids" read "alkaloidal hydrochlorides."	✓
"	419,	"	1;	for "stramonium" read "strophanthus."	✓
"	419,	"	17;	for "Suprarenales" read "Suprarenalum."	✓
"	620,	"	13;	after "water," insert "set aside for two hours."	✓
"	696,	"	41;	for "Sulphonmethane" read "Sulphonethylmethane."	✓
"	852,	"	13;	after "Effervescens" add "which may be made in the same way as the corresponding preparations of antipyrine, but should contain only 5 per cent. of phenacetin."	✓
"	848,	"	35;	for "Nutriens" read "Peptonata."	✓
"	897,	"	29;	for "6 to 18" read "60 to 180."	✓
"	909,	"	41;	for "Ranunculaceæ" read "Berberideæ."	✓
"	938,	"	26;	for "20" read "30."	✓
"	947,	"	16;	for "Suprarenali" read "Suprarenalis."	✓
"	966,	"	24;	after "hours," insert "dissolve."	✓
"	977,	"	20;	after "8" insert "to 10."	✓
"	1048,	"	30;	for "20" read "60."	✓
"	1118,	"	6;	for "carbonate" read "bicarbonate."	✓
"	1120,	"	40;	for "citric" read "acetic."	✓
"	1120,	"	40;	delete "citrate."	✓
"	1121,	"	16;	for "Glycerophosphatis" read "Glycerophosphatum."	✓
"	1133,	"	25;	after "tablets" add "except in the case of cocaine, erythrol, and menthol tablets, where the quantities are given for single tablets."	✓
"	1167,	"	15;	for "2.5" read "sufficient."	✓
"	1188,	"	4;	for "10.00" read "20.00."	✓
"	1246,	"	14;	for "mix" read "melt."	✓
"	1290,	"	16;	for " $C_{23}H_{34}N_2O_4$ " read " $C_{23}H_{32}N_2O_4$ ."	✓

The Publisher will be glad to receive early intimation of any further errors or omissions which may be detected.



# P R E F A C E

• TO THE

## BRITISH PHARMACEUTICAL CODEX, 1907.

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THE scope of this work may be defined by describing the book as an Imperial dispensatory for the use of medical practitioners and pharmacists, since it contains information respecting all drugs and medicines in common use throughout the British Empire, including the principal substances and preparations which are official in the Pharmacopœias of France, Germany, and the United States, as well as those described in the British Pharmacopœia. The chief aim of the work is the provision of accurate information for prescribers and dispensers, special attention being given to the requirements of those practising in the British dominions beyond the seas. Pharmacopœias were originally produced for the purpose of enabling dispensers to determine the meaning and value of the terms employed in extemporaneous prescriptions, and thus gradually became registers of approved and established remedies, containing descriptions of the drugs and chemicals officially recognised for use in the treatment of disease, with formulæ for such compounded medicines as admitted of being kept ready for use. It is well known, however, that pharmacopœias do not, as a rule, deal with more than a portion of the *materia medica* in common use at the time they are published. Numerous medicaments in constant demand are excluded because their value as remedies is not thought to be sufficiently established; others, again, cease to receive official recognition though the demand for them continues.

With the object of providing recognised formulæ for medicines which are not official in the British Empire, various supplements to the pharmacopœias have been published from time to time, the most notable being that of Gray, which first appeared in 1818,



In that work was originally given a concise account of the actual state of the existing knowledge of drugs in general; subsequent editions of Gray's 'Supplement,' edited by the late Professor Redwood, were equally comprehensive in their scope, and included a great number of unofficial formulæ for the preparation of medicinal substances which were prescribed by practitioners in medicine, and supplied by those who practised pharmacy. This extremely useful work, however, has not been re-published since the British Pharmacopœia was called into existence by the Medical Act of 1858, though there has been no lack of excellent books, produced by private enterprise, which have served in great measure to fill the place which the 'Supplements' of Gray and Redwood formerly occupied. These more recent works have usefully supplemented the official *materia medica* by giving particulars of medicinal articles which were formerly official; in addition, they have furnished much valuable information concerning the newer *materia medica*, consisting of substances and preparations which have not yet attained the status of officially approved and established remedies. But no book hitherto published has realised the ideal of a guide such as is needed throughout the British Empire by those engaged in the prescribing or dispensing of medicines. A work published by the authority of some statutory body was manifestly required to meet the needs of the case; and, by a resolution formally adopted on November 4, 1903, the Council of the Pharmaceutical Society of Great Britain decided to produce a book of reference which, as now completed, may fairly be regarded as supplying authoritative guidance to those concerned.

The plan of the work may be described briefly as resembling generally that of most pharmacopœias and dispensatories. Monographs on drugs of vegetable and animal origin, and others dealing with chemical substances used in medicine, with formulæ for galenical preparations and solutions, are arranged in strict alphabetical order under Latinised names, with English equivalents, and synonyms where such exist. In the case of crude drugs, each monograph begins with a brief statement as to the botanical or zoological, geographical, and commercial sources of the drug, the natural order or family to which the plant or animal belongs, and the methods of collecting and preparing the drug for the market. Then follows a detailed description of the drug, including, where necessary, its distinctive histological features and information regarding its important chemical constituents. The pharmacological action of the drug is next described, its common uses are mentioned, and notes are given respecting the best methods of prescribing and



dispensing the remedy. The dose of the medicament is given in both metric and Imperial quantities, and special notes on methods of storage, adulterants, etc., are provided, where required, in smaller type. The monographs on chemical substances are arranged in much the same way, brief references to the methods of production being followed by descriptions, statements of physical properties, tests, antidotes, etc. Pharmacological notes and suggestions as to prescribing and dispensing follow, with doses and special notes as in the case of crude drugs, attention being directed to the different commercial varieties, where such varieties are used for scientific and technical purposes, as well as in medicine.

In order to render the work more valuable to medical practitioners, much information is given regarding the properties of drugs, and the conditions and diseases in which galenical preparations are usually given. The notes on the properties of drugs are not mere excerpts from medical literature, but original and concise descriptions of physiological action, which should assist medical practitioners to formulate a rational therapy, without encouraging counter prescribing. No attempt is made to deal fully with the subject of therapeutics, and the notes on prescribing are simply such as will assist medical practitioners to construct their prescriptions in a scientific and practical manner.

The formulæ for galenical preparations and solutions are arranged on a somewhat novel plan, every preparation being made up, except in few instances, to one hundred parts by weight or volume. As a result, either metric or Imperial weights may be employed in compounding, and prescribers can see at a glance what is the approximate percentage composition of any preparation. This centesimal system of representing formulæ possesses certain disadvantages, which are perhaps most marked in the case of such classes of preparations as lozenges, pills and suppositories. As a means of overcoming these disadvantages and minimising the labour of calculating the quantities required to make a pint, pound, or ounce of any preparation, the conversion table specially compiled for that purpose should be found useful. At the same time, the use of decimal (metric) weights and measures is recommended.

Greater prominence is given to many classes of galenical preparations than is usually accorded to them in pharmacopœias, and the formulæ include many which are entirely new, though they have been tried and tested, the idea being to provide recognised methods of preparing compounded medicines which are not recognised in the British Pharmacopœia. Notes on the uses of the

galenical preparations and solutions are given in most instances, and the doses appear in both metric and Imperial quantities. In order to avoid risk of error, the practice followed in stating doses in the metric system has been to denote any decimal part of a gramme by its proper denomination—decigram, centigram, or milligram, as the case may be; similarly, doses of liquid medicines are stated as so many mils, decimils, or centimils, in preference to expressing the quantities in cubic centimetres and fractions thereof. The use of the words “mil,” “decimil,” and “centimil” has been resorted to as a means of overcoming a difficulty which seemed likely to retard the much to be desired adoption of the metric system by prescribers. The custom of measuring liquids, which tends to accuracy, besides saving time in practice, renders it imperative that there should be convenient short names for small metric measures of capacity, and the adoption of the new terms may be regarded as completing the metric system, which has hitherto required the addition of conveniently-named small measures of capacity, corresponding in volume to the “cubic centimetre” and fractional parts of that measure, for use in countries where liquids are measured rather than weighed. Apart from the use of the new terms in stating doses, it will be found that the term “mil” is used throughout the work, as representing the one-thousandth part of a litre, instead of the less accurate “cubic centimetre,” or its abbreviation “c.c.,” the use of which is often open to criticism.

Special attention has been devoted to the nomenclature of substances of definite composition which are known under a variety of names, and it has been considered desirable to describe such substances under brief, more or less descriptive names, which have, in some instances, been specially devised for the purpose. Reference is made to trade-protected names and other commercial designations of such substances in footnotes to the respective monographs, though prescribers will prefer to encourage the use of names which everyone is free to use. Trade-names, as a rule, can only be legally applied to products of firms or individuals in whom proprietary rights in those names are vested, and the attention of dispensers is particularly directed to the fact that, when a medicament is ordered under a proprietary trade-name, it is not permissible to substitute a similar product to which that trade-name does not legally apply.

With the object of securing uniformity in prescribing and dispensing practice, the formulæ given, where not original, correspond to those with the same names in the British Pharmacopœia, the British Pharmaceutical Conference ‘Unofficial



Formulary,' the 'Australian Pharmaceutical Formulary,' the 'Bournemouth Formulary,' the 'Canadian Compendium of Medicines,' the 'National Formulary,' and various hospital and foreign pharmacopœias. It should be clearly understood that the official substances or preparations are intended wherever the names of drugs, chemicals, galenical preparations, and test solutions accord with those of the British Pharmacopœia. Terms such as "water-bath," "ordinary temperature," etc., should be regarded as having the same significance as in the British Pharmacopœia; the same applies to the degrees of fineness of powders. All liquids should be measured unless it is specially directed that they are to be weighed; statements regarding solubilities and specific gravities must be understood to refer to determinations at 15.5° Centigrade, unless otherwise specified; temperatures are invariably stated in degrees Centigrade; the atomic weights used are those adopted by the International Committee on Atomic Weights, in its report for the year 1907. The use of abbreviations in the text has been avoided as far as practicable; of the few which have been used for the sake of convenience, the letters "B.P." stand for British Pharmacopœia, "P.G." for the German Pharmacopœia, "U.S.P." for the Pharmacopœia of the United States of America, "N.F." for the 'National Formulary of Unofficial Preparations,' and "w/v" represents "weight in volume," indicating that a weighed quantity of a solid substance is contained in solution in a measured quantity of liquid. An exhaustive index is provided, in which lists of the preparations of all drugs and chemicals will be found under the English names of the substances, the Latin names of the medicaments and their chief preparations being also given, as well as the names of everything of importance mentioned in the text.

The production of the work has been entrusted by the Council of the Pharmaceutical Society to the following Committee:—

Mr. MICHAEL CARTEIGHE, *Chairman*.

Mr. C. B. ALLEN.

Mr. G. T. W. NEWSHOLME.

Mr. S. R. ATKINS.

Mr. R. A. ROBINSON.

Mr. J. F. HARRINGTON.

Mr. J. RYMER YOUNG.

This Committee has deputed the labour of compiling the information and conducting investigations to a Sub-Committee, consisting of Dr. W. E. DIXON, Professor of Pharmacology, King's College, London; Professor H. G. GREENISH, F.I.C., F.L.S.; Mr. EDMUND WHITE, B.Sc. (Lond.), F.I.C., Mr. W. F. GULLIVER, Mr. F. W. GAMBLE, and Mr. JOHN HUMPHREY (Secretary). During the earlier stages of the work Mr. HAROLD WILSON (since

deceased) and Mr. WILLIAM KIRKBY were associated with the Sub-Committee, and the thanks and acknowledgments of the Council are also due to many other members of the Pharmaceutical Society of Great Britain, who have rendered whole-hearted service, and spared no endeavour to bring the work to a successful issue.

In conclusion, attention must be directed to the fact that much arduous labour has been devoted to problems which have required extended research for their solution. Some of this work has been performed in the Pharmaceutical Society's Pharmaceutical Research Laboratory, but a large proportion has been privately undertaken by individual members of the Society, and many of the results have been recorded during the past four years in *The Pharmaceutical Journal*. Further research will be needed before certain sections of the Codex can be regarded as entirely satisfactory, and the Council therefore invites the co-operation of the pharmacists of the British Empire in rendering the work more generally useful and valuable as a book of reference.

October 1, 1907.



THE  
BRITISH PHARMACEUTICAL CODEX

1907





# British Pharmaceutical Codex, 1907

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## ADDITIONAL CORRIGENDA.

In addition to the list of corrections printed at page xii., the following should be noted :—

- Page 167, line 23 ; delete the whole line. ✓  
,, 292, ,, 20 ; for " mucilage " read " decoction." ✓  
,, 292, ,, 25 ; for " mucilage " read " decoction." ✓  
,, 942, ,, 3 ; before " Menthol " insert " Compound." ✓  
,, 1135, ,, 16 ; for " Salacetini " read " Salacetici." ✓  
,, 1147, ,, 9 ; for " 80.00 " read " 8.00." ✓  
,, 1410, column 2, line 41 ; for " Salacetini " read " Salacetici."





# THE British Pharmaceutical Codex

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*All liquids should be measured unless the contrary is specifically indicated, and it must be understood that the official articles are intended where the names of drugs, chemicals, galenical preparations, and test-solutions accord with those of the British Pharmacopœia. The equivalents given after chemical formulæ are based upon international atomic weights (1907); temperatures are stated in degrees Centigrade; specific gravities are to be determined at 15.5° C., unless otherwise specified; "Alcohol" means "Alcohol (90 per cent.)."*

The letters "B.P.C." should be used to indicate the unofficial remedies described in this book.

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## ABRI SEMINA.

### ABRUS SEEDS.

*Synonyms.*—Jequirity; Prayer Beads.

Abrus seeds are obtained from *Abrus precatorius*, Linn. (N.O. Leguminosæ), a common Indian and Brazilian shrub.

The seeds are well characterised by their smooth, glossy surface and bright scarlet colour, with a black patch at the hilum; they are ovoid or sub-globular in shape, and vary from 5 to 8 millimetres in length, their breadth being about 4 or 5 millimetres. The hard kernels possess the characteristic leguminous odour and taste.

The chief constituents of the seeds are two proteid poisons, a vegetable paraglobulin and a phytalbumose, a mixture of the two substances being known as abrin. The activity of the globulin is destroyed at 75° to 80°, and that of the albumose at 85°. It has been stated that the seeds also contain a substance called abric acid,  $C_{21}H_{24}N_8O$ . Traces of an alkaloid (abrine), an organic acid, and a substance resembling glycyrrhizin have been isolated from the root (see Notes).

Abrin has much the same action as ricin, but is less poisonous. An infusion of abrus seeds has been applied to the eye in granular lids and in opacities of the cornea, but it is a dangerous remedy, as the inflammation which it sets up is beyond control, and in some instances the eye has been destroyed. A paste of the powdered seeds has been used as an application to lupus, and to tuberculous and syphilitic ulcerations. The infusion (1 in 12½) should be prepared at a temperature not exceeding 50°; for some purposes a

weaker infusion is used (1 in 50 or less). These preparations should be freshly made as required for use, otherwise they quickly decompose, unless a small proportion of boric acid be added. The paste should be prepared from the decorticated seeds only.

NOTES.—Abrus root (Indian liquorice) contains a substance resembling glycyrrhizin, together with a resin and a trace of alkaloid (abrine); though it is less active the root possesses properties similar to those of the seeds, and it may not therefore be employed as a harmless sweetening drug.

## ABSINTHIUM.

### ABSINTHIUM.

*Synonym.*—Wormwood.

Absinthium consists of the leaves and tops of *Artemisia Absinthium*, Linn. (N.O. Compositæ), a herbaceous plant, growing in Northern Asia and Europe, and naturalised in the United States. The leaves and tops should be gathered in July and August, when the plant is in flower.

The stem is pale brownish-grey in colour, longitudinally furrowed, and, like the leaves, bears numerous short, downy or silky hairs. The lower leaves have rather long petioles, the upper short; they are simply, doubly or trebly pinnatisected, the ultimate divisions being lanceolate and somewhat acute. The inflorescence is a large leafy panicle, bearing numerous small capitula. The latter are hemispherical in shape, about 3 millimetres broad, and bear on a small hairy convex receptacle numerous yellow florets, which are destitute of a pappus. The odour is aromatic; the taste aromatic and bitter. Both upper and under surfaces of the leaf bear abundant hairs and glands. The former consist of a long spindle-shape cell supported horizontally at its centre on a short three-celled pedicel. The glands possess the structure common to the glands of composite plants.

The chief constituent of wormwood is a volatile oil, of which the herb yields from 0·5 to 1·0 per cent. It is usually dark green or sometimes blue in colour, and has a strong odour and bitter, acrid taste. It consists of thujone,  $C_{10}H_{16}O$  (absinthol or tanacetone), thujyl alcohol,  $C_{10}H_{18}O$  (both free and combined with acetic, isovalerianic and other acids), cadinene, phellandrene, pinene, etc. The herb also contains a bitter glucoside, absinthin,  $C_{15}H_{20}O_4$ , and absinthic acid.

The most characteristic action of absinthium is stimulation of the cerebral hemispheres. It first produces symptoms like those of camphor, followed in much larger doses by convulsions exactly resembling those of the epileptic fit. Those addicted to the use of absinthe fall into a condition known as absinthism. This is shown by restlessness, vomiting, vertigo, tremors, and epileptiform convulsions in which the patient loses consciousness, falls down, has clonic



convulsions, and may bite his tongue, pass water, and foam at the mouth. This drug is rarely employed, but it might be of value in nervous diseases such as neurasthenia, or in any condition in which a direct stimulation of the cortex cerebri is desirable. For internal administration absinthium is used in the form of tincture (1 in 8 or 10), and infusion (1 in 10 or 20). It was formerly an ingredient of various vinous preparations, of which absinthe is the present representative.

### ACACIÆ CORTEX.

ACACIA BARK.

*Synonym.*—Babul Bark.

Acacia bark is obtained from *Acacia arabica*, Willd., or *A. decurrens*, Willd. (N.O. Leguminosæ). The former grows in India, Arabia, and Africa; the latter is indigenous to Australia. The bark is collected from both wild and cultivated trees not less than seven years old. It is then dried and should be kept for a year before use.

The bark of *Acacia arabica* occurs in hard and woody pieces, rugged externally, with longitudinal and transverse fissures and cracks. The inner surface is rusty red in colour, very fibrous, and marked with longitudinal striations. The taste is astringent and mucilaginous. The bark of *Acacia decurrens*, or black wattle, also occurs in hard and woody pieces, from 2.5 to 5 centimetres broad and 1.5 to 3 millimetres thick. Externally it is rugged and of a greyish-brown colour; the inner surface is dark reddish-brown and longitudinally striated. The fracture is brittle and coarsely fibrous; the odour faint; taste astringent.

Acacia bark contains tannin (about 22 per cent.) and gallic acid. Decoctum Acaciæ Corticis (1 in 16) is used as a substitute for the decoction of oak bark; it is of service as an astringent gargle, lotion, or injection.

NOTE.—Acacia bark is used in India and the Australasian and Eastern Colonies instead of oak bark.

### ACACIÆ GUMMI.

GUM ACACIA.

*Synonyms.*—Acacia; Gum Arabic.

Gum acacia is obtained from certain species of *Acacia*, the chief being *Acacia Senegal*, Willd. (N.O. Leguminosæ), a small tree indigenous to East and West Africa. The gum exudes from the stem and branches spontaneously, but the flow is often stimulated by incisions in the bark. The exuded gum hardens on exposure to the air, and is then collected, dried, and exported. Much is sent to Trieste, where it is sorted for the European and other markets.

The gum occurs in rounded or ovoid brittle tears, varying much in diameter. They are either colourless or of a pale yellowish

tinge, and appear opaque from the presence of numerous minute fissures. Small angular fragments are often present, and these have a vitreous appearance. The gum should be inodorous, and have a bland, mucilaginous taste. It is insoluble in alcohol but entirely soluble in water, forming a viscid solution, which is neither glairy nor ropy, and gives a slightly acid reaction to litmus. When solution of lead subacetate is added to the aqueous solution of the gum a copious white precipitate is produced, while with saturated solution of borax a clear white jelly is obtained; the solution should give only a slight precipitate with solution of mercuric chloride.

Gum acacia consists chiefly of arabic acid in combination with calcium, potassium, and magnesium. It contains about 12 per cent. of water and yields from 2·7 to 4 per cent. of ash, consisting chiefly of calcium, potassium, and magnesium carbonates.

As a demulcent, gum acacia is prescribed in mixtures in the form of mucilage, and in various pastilles, jujubes, and pastes. It is also used occasionally as a masticatory, either in the tears or as a firm pastille containing a little sugar. In dispensing it is used as a suspending agent in mixtures containing heavy insoluble powders, but it should not be used with bismuth salts, with which it is apt to form flaky masses. It is also employed, in the form of powder or mucilage, for the emulsification of fatty and volatile oils and resinous tinctures. Freshly prepared mucilage should be used for this purpose, because the presence of acid in old mucilage prevents the production of a good emulsion. For the extemporaneous preparation of the mucilage, gum in coarsely granular powder should be triturated with distilled water. Finely powdered gum is generally to be preferred as an emulsifier, because it can be at once incorporated with the oil or oleo-resin, and upon the addition of twice as much water as gum the primary emulsion is easily produced. The proportions requisite in the case of fatty oils and oleo-resins are one part of powdered acacia to four parts of the oil. Volatile oils require somewhat more acacia, namely, one part to two parts of oil, unless the powdered gum is diffused in the oil, an equal volume of water added, and the mixture shaken, in which case as little as 5 per cent. of gum may suffice. In the case of resinous tinctures the mucilage should be used in the proportion of not less than one-sixteenth part of the finished mixture. Mucilage of acacia should not be used as an excipient for pills, because it makes them too hard; it may, however, be used with an equal quantity of syrup. As a dry excipient for pills, powdered acacia is sometimes serviceable when mixed with a small proportion of powdered marshmallow root, or an equal quantity of powdered liquorice root. The mucilage is incompatible with strong alcohol, borax, ferric salts, lead subacetate, and sulphuric acid.

NOTES.—Many varieties of gum acacia occur in commerce, but the most esteemed is that collected near Kordofan, the best qualities of which are almost colourless, and opaque because of the numerous cracks. Mogadore gum closely approaches it, but is of less fine appearance. The best qualities of Senegal gum are also suitable for pharmaceutical use; they are less opaque than the Kordofan



gum and contain occasional pieces of vermiform shape. Gums that are of yellow or brown colour usually contain tannin and should be rejected, as should also gums that are incompletely soluble in water, or such as yield ropy or glairy solutions.

## ACALYPHA.

### ACALYPHA.

Acalypha consists of the entire plant, *Acalypha indica*, Linn. (N.O. Euphorbiaceæ), which is indigenous to India. The herb is collected when in flower and dried, unless required for the preparation of the juice.

The plant has an erect rounded branching stem from 3 to 6 decimetres high, covered with small curved hairs. It bears ovate cordate leaves about 4 centimetres broad and 5 centimetres long on petioles of about the same length, the latter as well as the veins on the under surface of the leaves and the crenate margins being more or less hairy. The flowers are small and green and are borne on axillary spikes about as long as the leaves; they are enclosed in serrated funnel-shaped involucre opening on the inner side. The fruit is a three-celled, one-seeded capsule.

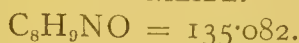
The chief constituents of acalypha are resin, tannin, volatile oil, an alkaloid acalypine, and possibly a saponin. The Succus Acalyphe is expressed from the fresh herb, and the Extractum Acalyphe Liquidum is prepared from the dried herb. In addition to these official preparations, an infusion of the root (1 in 10), a decoction of the leaves (1 in 20), and a tincture (1 in 8) are occasionally used.

Acalypha may be used to remove mucus in the bronchitis of children. The juice of acalypha is a useful emetic, and may be used in place of ipecacuanha. The drug also possesses laxative, expectorant, and anthelmintic properties.

NOTES.—Acalypha is used in India and the Eastern Colonies as an equivalent of senega. Other species of *Acalypha* are also used medicinally, including *A. paniculata*, Miquel, which has long, petioled, ovate, acuminate, coarsely and equally serrated leaves.

## ACETANILIDUM.

### ACETANILIDE.



*Synonyms.*—Phenyl-acetamide; Antifebrin.

Acetanilide,  $\text{C}_6\text{H}_5\text{NH}(\text{CH}_3\text{CO})$ , is the mono-acetyl derivative of aniline, prepared by the interaction of glacial acetic acid and aniline.

It occurs in colourless, odourless, shining lamellar crystals, with a somewhat pungent taste. Slightly soluble in cold water (1 in 190), soluble in boiling water (1 in 18), soluble in alcohol (1 in 4), readily soluble in ether, benzol, or chloroform. Melting-point, when dry,  $113.5^\circ$ . On heating acetanilide with solution of potassium

hydroxide until an odour of aniline is perceived, and then warming the liquid with a few drops of chloroform, phenyl isocyanide is formed, and gives off an unpleasant and penetrating odour. Acetanilide in aqueous solution is distinguished from phenacetin by the formation of a yellowish-white precipitate when solution of bromine is added. It should leave no residue on ignition, and should give no colour with nitric or sulphuric acid. It should also be neutral to litmus and free from aniline salts, phenazone, acetone, and allied substances.

Acetanilide is rapidly converted in the system to para-amido-phenol, and it is to this body that its action is due. It has much the same action as phenacetin, but ill-effects, such as cyanosis and collapse, are more likely to ensue, because the para-amido-phenol is liberated more quickly with this drug than with phenacetin (see Phenacetinum). Acetanilide is administered usually in cachets or in the form of tablets or powder. If it is desired to give it in a liquid form, it may be dissolved in a little weak spirit, such as brandy, or it may be suspended in water with the aid of mucilage of acacia or of compound tragacanth powder, or the Acetanilidum Effervescens may be used. For administration in cachets the Pulvis Acetanilidi Compositus, in which it is combined with caffeine and sodium bicarbonate, is useful. Tablettæ Acetanilidi Compositæ are similar in composition to a well-known nostrum, and constitute the only preparation of importance. In cases of poisoning by acetanilide, warmth should be applied to the feet and body, alcohol and ether administered by the mouth and subcutaneously, or strychnine subcutaneously.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

*NOTE.*—Acetanilide or some allied body, such as phenacetin, is understood to be the chief active ingredient of preparations supplied under the trade-names Ammonol, Antikamnia, Antiseptin, Antitoxine, Bromo-acetanilide, Phenalgin, etc.

## ACETANILIDUM EFFERVESCENS.

### EFFERVESCENT ACETANILIDE.

Acetanilide	...	...	...	...	5.00
Sodium Bicarbonate, in powder	...	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	...	24.00
Citric Acid, in powder	...	...	...	...	17.50
Refined Sugar, in powder	...	...	...	...	17.50

Mix the acetanilide, citric, and tartaric acids, and incorporate with the product the previously mixed sodium bicarbonate and sugar. Granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

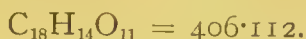
*Dose.*—2 to 4 grammes (30 to 60 grains).

*NOTE.*—This preparation contains approximately 5 per cent. (3 grains in 60 grains) of acetanilide.



## ACETANNIN.

ACETANNIN.



*Synonyms.*—Di-acetyl-tannin; Acetyl-tannic Acid; Tannacetin.

Acetannin,  $\text{C}_{14}\text{H}_8(\text{CH}_3\text{CO})_2\text{O}_9$ , is obtained by the action of acetic anhydride on tannic acid, and consists chiefly of the di-acetyl compound, the hydrogen atoms of two hydroxyl groups being replaced by acetyl groups.

It occurs as a pale yellowish-white or greyish, odourless and nearly tasteless, hygroscopic powder. Melts at  $187^\circ$  to  $190^\circ$ , with decomposition. Very soluble in alcohol, but almost insoluble in water or dilute acids, and only slightly soluble in ether; it dissolves in solutions of borax and sodium phosphate, and in lime water, the products being alkaline in reaction. When dissolved in solutions of the alkalies the compound decomposes gradually into alkali tannate and acetate.

This acid is a typical member of a large group of substances obtained by replacing the hydrogen in one or more hydroxyl groups by acidyl or acyl radicals, the acetyl and benzoyl radicals being chiefly employed. These acidyl derivatives are mostly insoluble in water or weak acids, but soluble with more or less rapid decomposition in alkaline liquids. The new compounds thus prepared from soluble alcohols, phenols, and hydroxy-acids, are usually insoluble and free from the strong local action of the original substances; they pass through the stomach unchanged and without disturbing digestion, but are decomposed in the alkaline intestine, with liberation of the soluble active substances from which they are derived. The introduction of these acidyl groups, however, sometimes causes marked changes in the medicinal properties of the mother-substance, *e.g.*, in the case of morphine.

Acetannin was introduced by Meyer as a substitute for tannic acid on the supposition that its insolubility would lead it to pass through the stomach unchanged, but that it would become active when it was rendered soluble by the alkali in the duodenum. Some of it passes through the alimentary canal unchanged, some is converted into tannic acid which has been detected in the human fæces. A mere trace is absorbed as sodium gallate and excreted by the urine. Acetannin should be a valuable drug in all conditions in which an astringent action on the intestines is required. It should be prescribed alone, in cachets, or in powders, the last-mentioned form being preferable when the drug is given for the chronic diarrhoea of children. For this purpose it may, with advantage, be mixed with milk sugar, and administered suspended in milk. It should not be prescribed with alkalies.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

*NOTES.*—Acetannin is also known under the trade-name Tannigen. It should be kept in a dry place in well-closed vessels.

**ACETOMORPHINÆ HYDROCHLORIDUM.**

ACETOMORPHINE HYDROCHLORIDE.



*Synonyms.*—Diacetylmorphine Hydrochloride;  
Diacetoxymorphine.

Acetomorphine hydrochloride,  $\text{C}_{17}\text{H}_{17}\text{NO}_3(\text{C}_2\text{H}_3\text{O})_2\text{HCl}$ , is a salt of diacetylmorphine, a base formed by the action of acetic anhydride on anhydrous morphine.

It occurs in white crystals. Soluble in water (1 in 2) and in alcohol (1 in 9), but insoluble in ether. Melting-point,  $232^\circ$  to  $233^\circ$ . On the addition of a drop of nitric acid to a little of the substance a yellow colour is produced which changes to greenish-blue on warming, after some time again becoming yellow. On warming with alcohol and sulphuric acid an odour of ethyl acetate is produced. The addition of a few drops of a mixture of equal parts of sulphuric and nitric acids produces a greenish-yellow colour, which is not changed on warming (distinction from ethylmorphine and benzylmorphine).

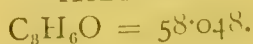
Acetomorphine resembles morphine in its action in allaying peripheral irritation and relieving pain. The introduction of acid (or alkyl) groups into the morphine molecule, however, weakens, though it does not remove, its depressing action on the respiratory centre, and lessens its narcotic effect. Acetomorphine thus resembles codeine, and is much employed to relieve irritable cough, especially in phthisis, asthma and bronchitis, with dyspnoea. Its use is not followed by headache, and it does not usually constipate. Glycerinum Acetomorphinæ and Elixir Acetomorphinæ Compositum are valuable preparations to allay cough, the latter combining with acetomorphine the expectorant properties of terpin hydrate. It is also given in the form of lozenge or pastille, 3 milligrams ( $\frac{1}{20}$  grain) in each. If prescribed in mixture form, acetomorphine hydrochloride should be given in neutral solution; it is readily decomposed both by acids and alkalis. In cases of poisoning by acetomorphine, the antidotes for morphine should be administered.

*Dose.*—2 to 10 milligrams ( $\frac{1}{40}$  to  $\frac{1}{8}$  grain).

*NOTE.*—Acetomorphine hydrochloride is also known under the trade-name Heroin Hydrochloride.

**ACETONUM.**

ACETONE.



*Synonym.*—Dimethyl-ketone.

Acetone or dimethyl-ketone,  $\text{CH}_3\text{COCH}_3$ , is prepared by the dry distillation of calcium acetate. As found in commerce the liquid contains about 99 per cent., by weight, of absolute acetone.



It occurs as a colourless volatile liquid with a characteristic odour. It is miscible with water, alcohol, ether, and chloroform in all proportions, without cloudiness. Specific gravity, 0.796 (about 0.790 at 25°). Acetone should mix with an equal volume of almond oil without cloudiness (limit of water, methyl alcohol, etc.). Boiling-point, when pure, 56.5°, but commercial acetone boils at 56° to 58°. It should be neutral to moistened litmus paper. It should leave no appreciable residue on evaporation. If 20 mls be mixed with 0.1 mil of decinormal solution of potassium permanganate the colour should not be destroyed in fifteen minutes (limit of readily oxidisable impurities).

Acetone has an action very similar to that of ethyl alcohol, but is slightly more poisonous. It is occasionally administered internally in aqueous solution in spasmodic conditions, such as asthma, but it is of little use. It is also used in the form of a spray for inhalations, usually combined with other medicinal agents.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTES.*—Acetone should be kept in well-closed vessels in a cool place, remote from fire or lights. It is a useful solvent of resins, fats, pyroxylin, celluloid, etc.; it is also a good menstruum for extracting certain drugs, owing to its low boiling-point, which enables the extracts to be evaporated at low temperatures.

## ACETOPHENONUM.

ACETOPHENONE.



*Synonym.*—Phenyl-methyl Ketone.

Acetophenone,  $\text{C}_6\text{H}_5\text{COCH}_3$ , may be prepared by distilling a mixture of calcium benzoate and calcium acetate, or by heating benzene with acetyl chloride and aluminium chloride, with subsequent purification.

It occurs as a colourless or slightly yellowish oily liquid, with an odour recalling bitter almonds and jasmine. Insoluble in water, but miscible with alcohol, ether, chloroform, olive oil, and almond oil. Cooled in ice it solidifies, the crystals melting again at 14°. Boiling-point, 198° to 200°. Specific gravity, 1.035.

Acetophenone may be administered internally in the form of gelatin capsules containing a solution in almond oil (1 in 10), or it may be dissolved in almond or olive oil and formed into an emulsion; almond mixture is a good vehicle. A single dose may be given by suspending with mucilage or a large proportion of syrup. It was introduced as a hypnotic, but it is uncertain in its action and is apt to cause ill effects.

*Dose.*—2 to 5 decimils (3 to 8 minims).

*NOTE.*—Acetophenone is also known under the trade-name Hypnone,

**ACETUM.****VINEGAR.**

Vinegar is an acid liquid produced by the oxidation of beer, wine, cider, or other alcoholic liquid, and consists essentially of impure acetic acid. Malt vinegar is the kind usually employed for medicinal purposes.

It occurs as a brown or nearly colourless liquid, the colour varying according to its origin. Malt vinegar (specific gravity, 1·017 to 1·025) is brown and has a peculiar odour. It contains from 3 to 6 per cent. of acetic acid, and weak vinegar may also contain not more than 0·185 per cent. by weight of sulphuric acid, added as a preservative. In addition to acetic acid, vinegar often contains traces of other organic acids, together with sugar, dextrin, colouring matters, and characteristic ethers, while malt vinegar yields an extract containing a notable proportion of phosphates.

Malt vinegar should be diluted with water when given internally. It is used in the preparation of Emplastrum Saponis Fuscum; also as a cooling lotion for bruises and sprains.

*Dose.*—4 to 30 mls (1 to 8 fluid drachms).

**ACETUM CANTHARIDINI.****VINEGAR OF CANTHARIDIN.**

Cantharidin	...	...	...	...	0·05
Glacial Acetic Acid	...	...	...	...	10·00
Acetic Acid, sufficient to produce	...	...	...	...	100·00

Mix the glacial acetic acid with the cantharidin, add 85 of acetic acid, dissolve on a water-bath, and add sufficient acetic acid to produce, when cold, 100.

Vinegar of cantharidin is recommended for use instead of Acetum Cantharidis, as it is of uniform strength.

**ACETUM CANTHARIDIS.****VINEGAR OF CANTHARIDES.**

Cantharides, bruised	...	...	...	...	10·00
Glacial Acetic Acid, a sufficient quantity.	...	...	...	...	...
Distilled Water, sufficient to produce	...	...	...	...	100·00

Extract the cantharides by maceration and subsequent percolation with glacial acetic acid mixed with an equal volume of distilled water.

Vinegar of cantharides is used generally, in a dilute form, to stimulate the growth of the hair (see Cantharis), but it should not be prescribed in ammoniacal hair washes. As the quantity of cantharidin in this preparation is apt to vary, Acetum Cantharidini has been suggested as an alternative preparation.

**ACETUM IPECACUANHÆ.**

## VINEGAR OF IPECACUANHA.

Liquid Extract of Ipecacuanha	...	...	5·00
Alcohol	...	...	10·00
Diluted Acetic Acid	...	...	85·00

Mix the liquids, filter the mixture, and add diluted acetic acid, if necessary, to make the product measure 100.

Vinegar of ipecacuanha has the same action as Vinum Ipecacuanhæ, but is said to give better results. On account of its acidity it should not be prescribed with alkalies.

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims).

**ACETUM MYLABRIDIS.**

## VINEGAR OF MYLABRIS.

Mylabris, bruised	...	...	10·00
Glacial Acetic Acid, a sufficient quantity.			
Distilled Water, sufficient to produce	...	100·00	

Extract the mylabris by maceration and subsequent percolation with glacial acetic acid mixed with an equal volume of distilled water.

Vinegar of mylabris has the same action as Acetum Cantharidis.

*NOTE.*—This preparation is used in India and the African and Eastern Colonies as a substitute for Acetum Cantharidis.

**ACETUM ODORATUM.**

## TOILET VINEGAR.

Oil of Bergamot	...	...	0·50
Oil of Cassia	...	...	0·10
Oil of Cloves	...	...	0·30
Oil of Lavender	...	...	0·20
Oil of Lemon	...	...	0·50
Tincture of Balsam of Tolu	...	...	1·00
Simple Tincture of Benzoin	...	...	10·00
Alcohol	...	...	50·00
Glacial Acetic Acid	...	...	4·00
Distilled Water, sufficient to produce	...	100·00	

Mix the oils and tinctures with the alcohol; then add the acid and water, shake well, and filter.

Toilet vinegar is used as a deodorant by sprinkling about the sick room; it is mixed with water for washing in the bath or hand-basin; a few drops are inhaled from the handkerchief as a restorative, or applied to the forehead to relieve headache.



**ACETUM OPII.**

## VINEGAR OF OPIUM.

Opium, in fine powder...	...	...	...	10'00
Nutmeg, in No. 30 powder	...	...	...	3'00
Refined Sugar	...	...	...	20'00
Diluted Acetic Acid, sufficient to produce	...	...	...	100'00

Macerate the opium and nutmeg in diluted acetic acid, 50, for seven days, stirring frequently; then strain and express. Mix the residue with diluted acetic acid, 20, then strain and express again. Mix and filter the strained liquids, dissolve the sugar in the filtrate, and pass through the filter sufficient diluted acetic acid to make the product measure 100.

*Dose.*—3 to 6 decimils (5 to 10 minims).

*NOTE.*—This preparation corresponds to Acetum Opii, U.S.P., but is made with weaker acid.

**ACETUM SCILLÆ.**

## VINEGAR OF SQUILL.

Squill, bruised	...	...	...	...	12'50
Diluted Acetic Acid	...	...	...	...	100'00

Macerate the squill in the acid for seven days; then strain, press, and add sufficient diluted acetic acid to make the product measure 100.

Vinegar of squill is employed chiefly as an expectorant in chronic bronchitis. On account of its acidity, it should not be prescribed with alkaline carbonates.

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims).

*NOTES.*—A preparation which corresponds closely to the official Acetum Scillæ is obtained by mixing 12·5 of liquid extract of squill with 87·5 of diluted acetic acid, and filtering the mixture through kieselguhr. Acetum Scillæ, U.S.P., is prepared with 10 of squill, in No. 20 powder, and sufficient diluted acetic acid (6 per cent.) to produce 100 by volume.

**ACETUM URGINEÆ.**

## VINEGAR OF URGINEA.

Urginea, bruised	...	...	...	...	12'50
Diluted Acetic Acid, sufficient to produce	...	...	...	...	100'00

Exhaust the urguinea by maceration, as directed in the case of Acetum Scillæ.

This preparation is used in India and the Eastern Colonies as a substitute for Acetum Scillæ, which it resembles in its properties.

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims).

**ACIDUM ACETICUM.**

## ACETIC ACID.



*Synonym.*—Strong Acetic Acid.

Acetic acid,  $\text{CH}_3\text{COOH}$ , is obtained by the destructive distillation of wood, or by the oxidation of alcohol. It should contain 33 per cent. by weight of real acid.

It occurs as a clear, colourless, pungent liquid, miscible with water and alcohol in all proportions. Specific gravity, 1.044. The acid should be free from metals, chlorides, nitrates, sulphates, sulphites, and formates, and should not contain more than traces of substances oxidisable by potassium permanganate.

Acetic acid is oxidised in the body and is excreted in the urine as carbonate. It is used in mixtures in the form of the dilute acid, or of oxymel, or of oxymel scillæ, all of which are official. Externally it is applied as a lotion, as a liniment, such as the official *Linimentum Terebinthinæ Aceticum*, or as a caustic pigment, when the glacial acid should be used. The well-diluted acid is employed as a gargle (1 in 30). Acetic acid has been employed as a menstruum for making non-alcoholic preparations resembling tinctures. Acetic acid is incompatible with alkalies, alkaline salts, hydrates, carbonates, and bicarbonates.

NOTE.—*Acidum Aceticum*, U.S.P., contains 36 per cent. by weight of real acid, and its specific gravity is about 1.045 at 25°.

### ACIDUM ACETICUM AROMATICUM.

#### AROMATIC VINEGAR.

Oil of Bergamot	...	...	...	...	2.50
Oil of Cinnamon	...	...	...	...	1.25
Oil of Cloves	...	...	...	...	10.00
Oil of Lavender	...	...	...	...	5.00
Oil of Orange	...	...	...	...	5.00
Oil of Thyme	...	...	...	...	2.50
Glacial Acetic Acid, sufficient to produce	...	...	...	...	100.00

Mix the oils, add the acid, shake well, and filter.

Aromatic vinegar is employed as a restorative by inhaling from a small saturated sponge contained in a vinaigrette. It should be distinguished from toilet vinegar (see *Acetum Odoratum*).

### ACIDUM ACETICUM DILUTUM.

#### DILUTED ACETIC ACID.

Acetic Acid	...	...	...	...	12.47
Distilled Water, sufficient to produce	...	...	...	...	100.00

Add the water to the acetic acid, and mix. The product should contain 4.27 per cent. by weight of real acid.

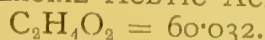
Diluted acetic acid has a similar action to other diluted acids, as described under *Acidum Hydrochloricum Dilutum*. It is sometimes sponged on the skin to prevent excessive sweating.

*Dose*.—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

NOTE.—*Acidum Aceticum Dilutum*, U.S.P., contains 6 per cent. by weight of real acid, and its specific gravity is about 1.009 at 25°.

### ACIDUM ACETICUM GLACIALE.

#### GLACIAL ACETIC ACID.



Glacial acetic acid,  $\text{CH}_3\text{COOH}$ , may be obtained by the dis-

tillation of dried sodium or calcium acetate with strong sulphuric acid. It should contain 99 per cent. by weight of hydrogen acetate.

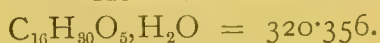
It occurs as a clear colourless liquid, or colourless crystalline mass, with a strong pungent odour. The acid crystallises if cooled to a low temperature, but the crystals melt again at about  $14.8^{\circ}$ . Specific gravity, 1.058 (about 1.049 at  $25^{\circ}$ ), increased by the addition of 10 per cent. of water. Boiling-point not less than  $117^{\circ}$  to  $118^{\circ}$ . The acid should be free from such impurities as may occur in Acidum Aceticum.

Glacial acetic acid is used as a mild caustic for destroying warts.

NOTES.—The official melting-point for glacial acetic acid ( $15.5^{\circ}$ ) corresponds to a stronger acid than 99 per cent.; an acid not answering to the permanganate test (see Acidum Aceticum) usually has a still lower melting-point.

### ACIDUM AGARICUM.

AGARIC ACID.



*Synonym.*—Agaricin.

Agaric acid,  $\text{C}_{14}\text{H}_{27}\text{OH}(\text{COOH})_2, \text{H}_2\text{O}$ , is obtained from *Polyporus officinalis* (N.O. Hymenomycetes), a fungus growing on larch trees.

It occurs as a white, or nearly white, shining, crystalline powder, which is almost odourless and tasteless. Slightly soluble in cold water, and in alcohol (1 in 130); solutions in caustic alkalies froth freely. Melting-point,  $140^{\circ}$ . The acid should dissolve in boiling water to form a perfectly clear foaming liquid.

Agaricin may be given in pills, alone or mixed with compound powder of ipecacuanha. It paralyses the nerve terminations in the sweat-glands, and is therefore valuable for stopping the night-sweats in phthisis. Large doses have a purgative action, to prevent which it may be prescribed with some preparation of opium, such as the compound powder of ipecacuanha. It should not be administered hypodermically, as it causes intense pain and inflammation. It is superior to atropine in that it does not cause dryness of the mouth and throat and has little effect on the eye and pupil.

*Dose.*—2 to 6 centigrams ( $\frac{1}{4}$  to 1 grain).

NOTE.—Some impure samples of agaric acid have a yellowish colour.

### ACIDUM ANISICUM.

ANISIC ACID.



*Synonym.*—Paramethoxy-benzoic Acid.

Anisic acid,  $\text{C}_6\text{H}_4(\text{OCH}_3)\text{COOH}$ , may be prepared by the oxidation of anethol.

It occurs in the form of colourless and, when pure, odourless crystals, but usually has a faint odour of anise. Insoluble in water,



soluble in alcohol (1 in 50) and ether. Melting-point, when pure,  $184^{\circ}$ ; it should not melt under  $180^{\circ}$ . Boiling-point,  $275^{\circ}$  to  $280^{\circ}$ . It should not decolorise potassium permanganate, and should give no colour with ferric chloride. It may be titrated with alkali, using phenol-phthalein as indicator.

Anisic acid is used in similar conditions and for the same purpose as salacetic acid, which it resembles closely. It is administered usually as the sodium salt, which is prepared by neutralising the acid with sodium carbonate or bicarbonate. The acid is saponified in the small intestine, salicylic acid being liberated.

*Dose.*— $\frac{1}{2}$  to 1 gramme (5 to 15 grains).

## ACIDUM ARSENICUM.

ARSENIC ACID.



Arsenic acid,  $\text{H}_3\text{AsO}_4, \frac{1}{2}\text{H}_2\text{O}$ , may be prepared by oxidising arsenious anhydride with nitric acid.

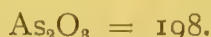
It occurs in colourless, deliquescent crystals, or in granular powder. Very soluble in water, alcohol, and glycerin. When the acid deliquesces, a thick syrupy liquid is formed (specific gravity, 2.5). Melting-point about  $100^{\circ}$ . Heated to  $110^{\circ}$  it becomes anhydrous; at a higher temperature it loses oxygen and water, and arsenious oxide is formed and volatilised. It should be free from sulphuric and arsenious acids, nitrous compounds, and metals.

Arsenic acid is usually given in the form of the official *Ferri Arsenas* and *Sodii Arsenas*. It is rarely given in the free state, but, if prescribed, should be administered in the form of an aqueous solution. The arsenic compounds produce the same effects as arsenious compounds, but they are less poisonous and act more slowly.

*Dose.*—1 to 5 milligrams ( $\frac{1}{80}$  to  $\frac{1}{12}$  grain).

## ACIDUM ARSENIOSUM.

ARSENIOS ACID.



*Synonyms.*—Arsenic; Arseni Trioxidum; Arsenic Trioxide;

White Arsenic; Acidum Arsenosum; Arsenious Anhydride.

Arsenious acid or anhydride,  $\text{As}_2\text{O}_3$ , is prepared by roasting arsenical ores, and purified by resublimation.

It occurs as a heavy white powder, or in white, glassy, opaque, or striated masses. Soluble in cold water (1 in 60), more soluble in boiling water (1 in 20), and in glycerin (1 in 8); moderately soluble in alkalies and hydrochloric acid. On titration with standard solution of iodine, 99.8 per cent. of pure arsenious

anhydride should be indicated. By following the official directions, sodium carbonate is left in the solution to be titrated, and this will act on the iodine, producing inaccurate results. A better method is to dissolve the arsenious anhydride in hot caustic soda or potash, cool, make very slightly acid with hydrochloric acid, and then add the sodium bicarbonate.

The action of arsenious anhydride is dependent upon the negative ion  $\text{AsO}_3'''$  of arsenious acid. Externally it is an antiseptic, but is too poisonous for general use. Strong arsenical pastes were at one time employed as an application to cancerous ulcers; they caused a dry gangrene, which later separated as a slough. Poisoning occurred in many of these cases. It is frequently used by dentists, mixed with cocaine, to destroy nerves before stopping teeth. Arsenic is taken internally chiefly because of its action on nutrition. This action is shown by (1) Augmented proteid break-down. (2) Increased destruction of glycogen in the tissues, with an increase of lactic acid and a corresponding diminution of the alkalinity of the blood. (3) Fatty changes affecting the liver, kidneys, heart, and muscles. These changes are supposed to result from diminished oxidation of the tissues. Arsenic is employed in certain diseases of nutrition and as a general tonic, but how it exerts a beneficial action is unknown. It is valuable in malaria when quinine is not tolerated, and it has also a very extended employment in obscure blood diseases such as pernicious anæmia. As it does not produce its beneficial action by stimulating the bone-marrow to increased production of cells, it has been suggested that it may destroy the parasite which is possibly the cause of these conditions. Arsenious acid has an action on the nutrition of the skin; the subcutaneous fat is increased and the complexion improved; it also renders the coat of the horse and other animals thicker and more glossy. It is used with great benefit in chronic skin diseases such as eczema, psoriasis, lichen, and pemphigus. Arsenious acid is also employed with advantage in certain chronic nerve diseases, such as chorea and neuralgia: it is difficult to explain the benefit in these cases, because arsenic has no direct action on the central nervous system. This drug is also employed, but with doubtful advantage, in chronic rheumatism, leucæmia, lymphadenoma, asthma, chronic dyspepsia, gout, and cardiac weakness.

The two official solutions of arsenious anhydride, *Liquor Arsenicalis* and *Liquor Arsenici Hydrochloricus*, have alkaline and acid reactions respectively, and this must be remembered when they are prescribed in mixtures. *Liquor Sodii Arsenatis*, which is often used, is also alkaline. A stable solution, which is practically neutral, can be prepared by dissolving 1 per cent. of arsenious anhydride in distilled water (see *Liquor Acidi Arseniosi*). Arsenious anhydride may be prescribed in pills and tablets; in both cases care must be taken to ensure thorough subdivision of the drug by triturating with some inert substance, such as milk sugar, which may be massed with glucose. Occasionally

Liquor Arsenicalis is administered hypodermically, but more commonly soluble arsenate of iron or the cacodylates of iron and soda are preferred for this purpose. Arsenic is incompatible with iron and magnesia compounds, lime water, and astringent matters. In cases of poisoning by arsenic, freshly prepared moist ferric hydroxide should be administered. The stomach is subsequently emptied and stimulants and warmth supplied.

*Dose.*—1 to 4 milligrams ( $\frac{1}{60}$  to  $\frac{1}{15}$  grain).

## ACIDUM BENZOICUM.

BENZOIC ACID.



Benzoic acid,  $\text{C}_6\text{H}_5\text{COOH}$ , may be obtained from benzoin, or prepared by oxidising toluene; it can also be prepared from hippuric acid and other organic compounds.

It occurs in white or yellowish-white crystalline plates or needles, odourless when pure, but when obtained from benzoin possessing a pleasant aromatic odour. Slightly soluble in cold water (1 in 390), readily soluble in boiling water (1 in 12), alcohol (1 in 3), ether (1 in 2.5), chloroform (1 in 7), and the fixed and volatile oils; also soluble in solutions of the alkalies and of calcium hydroxide. The pure acid melts at  $121.4^\circ$ , and boils at  $249^\circ$ , but that obtained from benzoin melts at about  $120^\circ$  and boils at about  $239^\circ$ . It should leave only a slight residue on ignition, and should be free from chlorine compounds and from hippuric and cinnamic acids. The presence of chlorine compounds may be indicative of artificial acid, and in employing the official test care must be taken that the calcium carbonate used as a reagent is free from chlorine, which is never absent from commercial calcium carbonate.

Benzoic acid has an action very similar to that of salicylic acid; it is even more powerfully antiseptic, for the presence of 0.1 per cent. inhibits the growth of most bacteria. Taken internally, it is rapidly absorbed and affects metabolism in the same way as the salicylates, but it does not produce the symptoms of "cinchonism." Benzoic acid combines with glycocholl in its course through the kidneys, and is excreted in the urine as hippuric acid. It is used in cystitis and other genito-urinary diseases to diminish the alkalinity and putridity of the urine. It has also a more limited use as an expectorant. After the use of this drug, the urine contains less aromatic sulphate and indican, and this is regarded as evidence of diminished putrefaction in the intestines. The acid is frequently prescribed in cachets, but it may also be given in the form of pills massed with an excipient containing a little tragacanth and glucose, and when required for its local action on the throat the Trochiscus Acidi Benzoici is suitable. If prescribed in a mixture it should be suspended with a fair proportion of mucilage of



acacia or tragacanth, or with syrup. The ammonium and sodium salts are, however, to be preferred for use in mixtures. When used for inhalation the natural acid is preferable. It has a preservative action like salicylic acid on articles of food and drink. A saturated aqueous solution is sometimes employed as a lotion, though the preparation is weak; a stronger form can be made by dissolving the acid in glycerin and water, or weak alcohol. Benzoic acid is incompatible with ferric salts, lead acetate, or mercuric chloride.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

### ACIDUM BORICUM.

BORIC ACID.



*Synonyms.*—Hydrogen Borate; Boracic Acid.

Boric acid,  $\text{B}(\text{OH})_3$ , may be obtained by adding sulphuric acid to an aqueous solution of borax, or by the purification of native boric acid.

It occurs in colourless, odourless, unctuous, shining scales. Soluble in cold water (1 in 25), in boiling water (1 in 3), in glycerin (1 in 4), and in alcohol (1 in 28). It should be free from lead and copper, and not contain more than traces of iron, calcium, magnesium, potassium, sodium, ammonium, chlorides, or sulphates. On titration of a solution (1 per cent.) in equal parts of distilled water and glycerin with standard solution of sodium hydroxide, using methyl orange as indicator, 99.8 per cent. of boric acid should be indicated.

This acid is used as a mild antiseptic and as a food preservative. Animal tissues will keep eight days in the presence of a 0.5 per cent. solution of the acid, and milk can be prevented from undergoing fermentation for several days in the presence of 0.2 per cent. Solutions of the acid are used to wash out cavities after operations; and in the solid form it is employed as a dusting powder or for application to simple ulcers about the mouth and tongue. It is not decided whether evil effects follow the continuous absorption of small doses of the acid such as might occur from eating butter or milk preserved with this substance. Boric acid given daily to children in small doses does not appear in any way to affect health. Poisoning by boric acid is shown by gastro intestinal symptoms (nausea, vomiting, and mild diarrhoea), nervous prostration, muscular weakness, and skin lesions such as scaly dermatitis, bullæ, and petechiæ.

Boric acid may be given in cachets, in pastilles made with glyco-gelatin, or in mixtures flavoured with syrup of orange. It is often given with tincture of hyoscyamus or infusion of buchu. The official preparations of boric acid are Glycerinum Acidi Borici, which contains the glyceryl ester of boric acid; and Unguentum Acidi

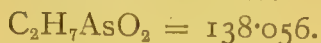
Borici (1 in 10). The ointment can be made of any desired consistence by altering the proportions of hard and soft paraffin in the official formula. Boric acid is also used as a dusting powder, either alone or mixed with starch, zinc oxide, or talc; for this purpose, and for preparing the ointment, a very fine powder should be employed. Bougies, pessaries, and suppositories containing boric acid may be prepared either with oil of theobroma or with the glycerin suppository basis. The acid is also used to medicate lint (50 per cent.), gauze (20 per cent.), and wool (25 to 50 per cent.). Aqueous solutions of the acid are of service as eye-lotion ( $\frac{1}{2}$  to 1 per cent.), douche, for irrigating the bladder and the vagina, and mouth-wash. As found in commerce, the crystals usually give a cleaner solution than the powdered boric acid. A saturated solution in alcohol may be used for instillation into the ear, and a simple solution in glycerin (1 to 4) is to be preferred to the official *Glycerinum Acidi Borici* for painting the throat.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

NOTES.—Boric acid is such a weak acid that its salts are hydrolysed perceptibly, particularly in weak solutions. It volatilises with steam at high temperatures. It is converted into metaboric acid,  $\text{HBO}_2$ , on heating it to  $100^\circ$ , tetraboric (pyroboric) acid,  $\text{H}_2\text{B}_4\text{O}_7$ , being formed at  $140^\circ$  to  $160^\circ$ , and boric anhydride,  $\text{B}_2\text{O}_3$ , at higher temperatures. Boric acid is present in *Glycerinum Boracis* and *Mel Boracis*, in consequence of the decomposition of borax by polyhydric alcohols, such as glycerin and the sugars. Solution of boric acid is prepared by dissolving 2.5 of the acid in sufficient alcohol to produce 100 by volume.

## ACIDUM CACODYLICUM.

CACODYLIC ACID.



*Synonym*.—Dimethyl-arsinic Acid.

Cacodylic acid,  $(\text{CH}_3)_2\text{AsOOH}$ , is prepared by heating the product of the distillation of a mixture of arsenious anhydride and potassium acetate with mercuric oxide. It contains 54.4 per cent. of arsenium, equivalent to 71.4 per cent. of arsenious acid.

It occurs in colourless crystals, hygroscopic in moist air, odourless when pure; very soluble in water (2 in 1), less soluble in alcohol (1 in  $3\frac{1}{2}$ ). Melting-point,  $200^\circ$ . It should be free from metals, chlorides, sulphates, oxalates, arsenites, and arsenates.

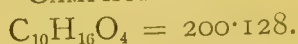
Cacodylic acid contains arsenic combined with the carbon atoms, but dissociation does not occur in the body to any appreciable extent, and the arsenic ion is not liberated, so that the arsenic is pharmacologically inert. The acid possesses some slight toxic effect, but that is quite out of proportion to the amount of arsenic present. In large doses a small quantity of arsenic is probably set free by the breaking down of the acid in the body, and the typical effects of the arsenic are thus produced. The acid is rarely given in a free state. Its salts are more generally prescribed, namely,

Ferri Cacodylas, Magnesii Cacodylas, and more especially Sodii Cacodylas. Besides these, mercury and guaiacol cacodylates are sometimes used. The acid may be given in the form of a mixture, flavoured with some strongly smelling agent such as peppermint, because it imparts a disagreeable alliaceous odour to the breath; or it may be injected hypodermically as a solution in sterile water (5 centigrams in 1 mil,  $\frac{3}{4}$  grain in 17 minims). The sodium salt is also administered as an injection per rectum. The salts of cacodylic acid are less toxic than the corresponding arsenites and arsenates.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

### ACIDUM CAMPHORICUM.

CAMPHORIC ACID.



Camphoric acid,  $\text{C}_8\text{H}_{14}(\text{COOH})_2$ , may be prepared by oxidising camphor with nitric acid.

It occurs in colourless, odourless flaky crystals, or as a crystalline powder with an acid, bitterish taste. Melting-point, when pure,  $186^\circ$  to  $187^\circ$ ; commercial samples sometimes have a lower melting-point, but it should not be under  $180^\circ$ . Slightly soluble in water (1 in 160), more soluble in alcohol (2 in 3) and ether, insoluble in chloroform. It gives a yellowish-brown precipitate with ferric chloride and a light blue precipitate with copper sulphate. It should have no odour of camphor and be free from chlorides, sulphates, and nitrates. Titrated with standard solution of potassium hydroxide, nearly 100 per cent. of pure camphoric acid should be indicated.

Camphoric acid has a mild camphor action; it is not very toxic and can be used in very large doses without serious effects; it is supposed to paralyse the nerve-endings going to the sweat-glands, and is used in the night-sweats of phthisis. It does not affect other secretions like atropine nor irritate the stomach like agaricin. It should be given two or three hours before bedtime. Camphoric acid is also employed in solution as a local astringent to the nose, throat, and bladder. The acid is usually given as powders, or in cachets. It may also be given in mixtures suspended in water, or dissolved by the addition of dilute alcohol or a flavouring tincture.

*Dose.*— $\frac{1}{2}$  to 1 gramme (5 to 15 grains).

### ACIDUM CARBOLICUM.

CARBOLIC ACID.



*Synonyms.*—Carbolic; Phenol.

Carbolic acid or phenol,  $\text{C}_6\text{H}_5\text{OH}$ , may be obtained from coal tar by fractional distillation. It should be free from cresol.



It occurs in small, colourless deliquescent crystals. Readily soluble in alcohol, ether, benzol, chloroform, carbon bisulphide or glycerin; also in the fixed and volatile oils and in solutions of alkalies. It is liquefied by the addition of 10 per cent. of water, forms a clear liquid with 30 to 40 per cent. of water, and should be completely dissolved by 12 parts of water. When pure and dry it melts at  $42^{\circ}$ , and the "detached crystals" of commerce melt at  $40^{\circ}$ , but the "ice crystals" are less pure and melt at a lower temperature. The boiling-point should not be higher than  $182^{\circ}$ . Specific gravity, at the melting-point, 1.060 to 1.066.

Carbolic acid is employed principally for its antiseptic action on micro-organisms. An aqueous solution (1 per cent.) destroys the virulence of septic and putrefactive bacteria and of the tubercle bacillus in a few minutes, but many hours' contact is necessary to kill the organisms. Spores are extremely resistant, and Koch found that to destroy anthrax spores a 5 per cent. solution was required to act for two days. Carbolic acid is used for disinfecting instruments, utensils, fæces, etc., and in surgery for the treatment of wounds. When it is applied to the skin as a 5 per cent. solution, or stronger, it produces a sensation of burning followed by numbness, and the skin appears white and opaque from the precipitation of the superficial proteids. This local anæsthetic action of concentrated solutions is occasionally made use of in the performance of small operations, such as opening abscesses. The presence of glycerin retards the local action considerably. Taken internally carbolic acid exerts its antiseptic action on the stomach, and is useful in cases of gastric fermentation, but on account of its irritant action it is not much used in the free state, sodium sulphocarbolate being preferred. It is rapidly absorbed from the alimentary canal or from wounds, and circulates in the blood as phenyl-sulphuric acid ( $C_6H_5OSO_2OH$ ).

For internal use, carbolic acid may be given in pills, massed with one and a half times its weight of liquorice powder, half its weight of compound tragacanth powder, and a sufficiency of syrup of glucose, added gradually in very small quantities. It may also be given in the form of mixture (either alone or in combination with sodium bicarbonate, or spirit of chloroform) or as a pastille or lozenge (3 centigrams ( $\frac{1}{2}$  grain) in each). Carbolic acid is conveniently capsuled by incorporating it with a mixture of wool fat and soft paraffin 6 to 12 centigrams (1 or 2 grains) of the acid may be contained in 2 or 3 decigrams (3 to 5 grains) of the mixture. It is largely used externally in the form of lotion, both for antiseptic purposes (1 in 20 to 40) and for its action as a local anæsthetic in allaying pruritis (1 to 5 per cent.). An aqueous solution is used as a gargle ( $\frac{1}{2}$  increased to 1 per cent. if its anæsthetic property is desired), as a mouth-wash (in the form preferably of solution of phenate of soda), as an inhalation (1 in 400 to 500 of water at  $60^{\circ}$ ), as a spray (1 in 150 of water). For burns and scalds a solution of 1 part of the crystallised acid in 20 or 40 parts of olive oil is frequently used. The pure acid is applied as a local anæsthetic in toothache,

or mixed with collodion (1 to 3), which it coagulates, or triturated with 3 parts of camphor to form Phenol-Camphor. A mixture of carbolic acid, 1 part; castor oil, 4 parts; and almond oil, 15 parts (Lund's Oil), is used for lubricating catheters, which should previously have been sterilised in aqueous phenol (1 to 20). The so-called Phenol Iodatum (10 per cent.) is occasionally used as a local application. Carbolic acid cannot be made into pills with camphor, thymol, menthol, resins, and gum-resins without the use of much absorbent powder; it is also incompatible with free ammonia and ammonium salts, ferrous salts, and lime. In cases of poisoning by carbolic acid, saccharated solution of lime, solution of magnesium or sodium sulphate, or olive or camphorated oil should be administered, 120 mls (4 fluid ounces) of camphorated oil forming a valuable antidote and stimulant. Heat should be applied to the extremities, and alcoholic stimulants given. Carbolic acid burns may be treated by the application of olive oil, lime water, or vinegar.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

*NOTE.*—Carbolic acid sometimes acquires a pink colour on keeping, especially if exposed to moist air, owing to the formation of some coloured derivative from traces of impurities present.

## ACIDUM CARBOLICUM LIQUEFACTUM.

### LIQUEFIED CARBOLIC ACID.

*Synonyms.*—Liquid Carbolic; Liquefied Phenol.

Carbolic Acid, in crystals	...	...	...	90.00
Distilled Water, by weight	...	...	...	9.00

Add the water to the carbolic acid, heat gently until the crystals melt, and mix.

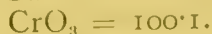
Liquefied carbolic acid is a colourless or pinkish product, and should form a clear solution on the addition of 18 to 27 per cent. of water at 15.5°. Specific gravity, 1.064 to 1.069. The boiling-point of the liquid rises gradually to a temperature not higher than 182°.

*Dose.*— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

*NOTES.*—Carbolic acid is liquefied by the addition of 8 per cent. of water, but the resulting liquid, like the official liquefied phenol, solidifies when kept under ordinary conditions in cold weather. If 12 per cent. of water be used the liquid does not solidify so readily. Phenol Liquefactum, U.S.P., contains 86.4 per cent. by weight of absolute phenol, and its specific gravity is about 1.065 at 25°.

## ACIDUM CHROMICUM.

### CHROMIC ACID.



*Synonyms.*—Chromic Anhydride; Chromium Trioxide.

Chromic anhydride,  $\text{CrO}_3$ , may be prepared by adding sulphuric acid to an aqueous solution of potassium bichromate.

It occurs in deliquescent, dark red, needle-shaped crystals. Very soluble in water (2 in 1). Melting-point, 192°. It usually con-

tains more than traces of sulphates. If a weighed quantity be added to excess of potassium iodide and hydrochloric acid, and the liberated iodine titrated with standard solution of sodium thio-sulphate, at least 90 per cent. of pure  $\text{CrO}_3$  should be indicated.

Chromic acid acts in virtue of its affinity for water, its powers of oxidation and precipitation of albumen depending upon this property. It is sometimes used to destroy granulations and excrescences, and to wash out poisoned wounds. The acid is decomposed readily by organic substances, such as alcohol, ether, glycerin, sugar, and tannin. For the destruction of superficial growths it is used in a concentrated aqueous solution (1 in 1); the official *Liquor Acidi Chromici* (25 per cent.) is also used for the same purposes. Weak solutions (about 2 to 3 per cent.) are used for affections of the tongue and mouth, as well as for application to the feet, while a weaker solution (1 in 400 to 500) is used as a gargle. As a general lotion and injection for antiseptic purposes, a very weak solution (1 in 2,000 or 4,000) may be used. Chromic acid is incompatible with most organic substances.

NOTE.—Chromic acid, both in the solid form and in solution, should be stored in glass-stoppered bottles.

## ACIDUM CINNAMICUM.

CINNAMIC ACID.



Cinnamic acid,  $\text{C}_6\text{H}_5\text{CHCHCOOH}$ , may be obtained from storax, balsam of Peru, or balsam of tolu; also by the oxidation of oil of cinnamon, or by the interaction of benzaldehyde and acetyl chloride.

It occurs in colourless, odourless crystals; on first placing in the mouth it is tasteless, but afterwards burning. Slightly soluble in water (1 in 3,500), readily soluble in alcohol and oils. Melting-point,  $133^\circ$ . The synthetic acid usually smells slightly of benzaldehyde, and melts at about  $130^\circ$ . It should be quite colourless (coloured samples should not be used), odourless, and should sublime without residue. It should be free from chlorides, and on titration with standard sodium hydroxide solution, 99 per cent. of cinnamic acid should be indicated.

Cinnamic acid has a similar action to benzoic acid, and its use by injection has been much vaunted as a cure for tuberculosis, great emphasis being laid on the power of the acid to induce leucocytosis; it is doubtful, however, if such an effect is produced in man, or, if produced, whether it is greater than would result from the action of many other substances. The insolubility of cinnamic acid in water has led to its use in the form of an oily emulsion, made with yolk of egg and a little added alkali; the quantity of acid incorporated is 5 per cent., and the emulsion is administered as an intravenous injection. To obviate the dangers of such applications, gluteal injections have been recommended. The sodium salt is quite soluble, and has to some extent replaced the



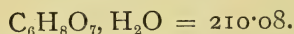
acid; a solution (1 in 20) is injected intravenously or hypodermically.

*Dose*.—3 to 16 milligrams ( $\frac{1}{20}$  to  $\frac{1}{4}$  grain); intravenously, 1 to 3 milligrams ( $\frac{1}{60}$  to  $\frac{1}{20}$  grain).

NOTE.—Cinnamic acid should be protected from the light as much as possible.

## ACIDUM CITRICUM.

CITRIC ACID.



Citric acid,  $\text{C}_3\text{H}_4\text{OH}(\text{COOH})_3$ ,  $\text{H}_2\text{O}$ , is prepared from the juice of lemons and other fruits produced by species of *Citrus*.

It occurs in colourless prismatic crystals, which are efflorescent in warm, dry air, and deliquescent in moist air. Very soluble in water (10 in 6), less soluble in alcohol (1 in 1.5), or glycerin (1 in 2). An 8 per cent. aqueous solution of the acid corresponds in strength to average samples of lemon juice. The acid should be free from lead, copper, iron, tartaric acid, and metallic particles; it should not contain more than traces of calcium or sulphates, and not leave more than 0.05 per cent. of ash. On titration with standard solution of sodium hydroxide, at least 99.4 per cent. of pure citric acid should be indicated. Lead is usually present in minute quantities in commercial samples, 1 part in 250,000 being a fair limit.

Citric acid is partly absorbed from the alimentary canal, and decomposed, being excreted by the kidneys in the form of sodium carbonate. It is used in dilute solution, or in the form of lemon or lime juice, as a refrigerant drink in fevers, the acid fruit-juices being used as prophylactics against scurvy. The alkaline citrates increase the secretion of the urine and render it less acid. For the administration of citric acid in the free state either *Succus Limonis* or *Syrupus Limonis* may be used. Effervescing mixtures are commonly prescribed, in which the citric acid is directed to be added in the form of a powder, or solution, to an alkaline mixture. Draughts prepared with a slight excess of acid are more agreeable, but the following are the proportions necessary to form neutral mixtures:—

Citric Acid, 10, will neutralise	Ammonium Carbonate .....	about $7\frac{1}{2}$
	(Freed from effloresced portions)	
	Magnesium Carbonate .....	7
	Potassium Bicarbonate .....	$14\frac{1}{2}$
	Potassium Carbonate (Anhydrous) ..	10
	Potassium Carbonate.....	$11\frac{1}{2}$
	(Commercial, $\text{K}_2\text{CO}_3 \cdot 1\frac{1}{2}\text{H}_2\text{O}$ )	
	Sodium Bicarbonate .....	12
	Sodium Carbonate (Anhydrous) ..	$7\frac{1}{2}$
	Sodium Carbonate ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ ) ..	$20\frac{1}{2}$

Citric acid is incompatible with alkalies, carbonates, potassium tartrate, and sulphides.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

**ACIDUM CRESYLICUM.**

CRESYLIC ACID.

 $C_7H_8O = 108.064$ .*Synonyms.*—Cresol; Cresolum Crudum; Cresyl Hydrate.

Cresylic acid,  $C_6H_4OHCH_3$ , is a mixture of ortho-, meta-, and para-cresols, three isomeric bodies which exist in tar. It may be obtained in a pure state by acting upon toluene with sulphuric acid, and heating the resulting sulphonic acid with potassium hydroxide.

Crude cresol occurs as a yellowish liquid, which darkens on keeping, and has a characteristic phenol-like odour. Slightly soluble in water (1 in 80), readily soluble in 90 per cent. alcohol, ether, chloroform, glycerin, and olive oil. If 10 mls of crude cresol be mixed with 50 mls of sodium hydroxide solution (15 per cent.) and 50 mls of water, a clear solution should remain, after long standing; if 30 grammes of hydrochloric acid and 10 grammes of sodium chloride be then added, and the whole shaken in a stoppered cylinder, the oily layer of cresol that separates should measure 8.5 mls to 9 mls. Pure ortho-cresol is a colourless, deliquescent crystalline solid, which has a characteristic odour, neutral reaction, and becomes yellow on keeping. Melting-point,  $28^\circ$  to  $30^\circ$ ; boiling-point,  $187^\circ$  to  $189^\circ$ . It should leave no residue on ignition. Soluble in water (1 in 38), readily soluble in alcohol, ether, glycerin, and caustic alkalies. Pure meta-cresol is a colourless or yellowish liquid. Slightly soluble in water, readily soluble in alcohol, ether, and chloroform. Boiling-point,  $202^\circ$ ; specific gravity, 1.0498. Pure para-cresol is a crystalline mass. Slightly soluble in water, readily soluble in alcohol and ether. Melting-point,  $36^\circ$ ; boiling-point,  $193^\circ$ .

Cresol bears the same relation to toluene as phenol does to benzene. The crude cresol employed medicinally is used as an inhalation in whooping-cough and other respiratory disorders; it is vaporised in a suitable apparatus until the atmosphere of the sick room is sufficiently saturated (see *Balneum Vaporis Creosoti*). The effects produced by the cresols are identical with those of phenol. Meta-cresol is the least poisonous and is a more efficient germicide than carbolic acid. Para-cresol is much the most poisonous. They are excreted in the urine as cresyl-sulphuric acid. In cases of poisoning by cresylic acid, the treatment for carbolic acid poisoning should be employed. Cresylic Acid enters into the composition of a number of proprietary disinfectants, such as *Cyllin*, *Creolin*, *Lysol*, *Saprol*, *Solutol*, *Solveol*, *Trikresol*, etc. A typical preparation of this class is *Liquor Cresolis Compositus*. It may advantageously displace carbolic acid in many preparations, such as lotions and ointments, because it is less caustic, and is said to be less poisonous. The "carbolic" powders of commerce are composed of crude cresol mixed with an earthy base. If lime be used the powder becomes pink on keeping, but it is often artificially coloured in addition. A silicate base, such as kaolin, does not

become pink on keeping. As commonly used, the disinfectant properties of such powders are almost negligible.

*Dose.*— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

### ACIDUM FORMICUM.

FORMIC ACID.



*Synonym.*—~~Animic~~ Acid. *Amnic Acid.*

Formic acid,  $\text{HCOOH}$ , may be prepared by heating together glycerin and oxalic acid, or from the sodium formate produced by the action of carbon monoxide on sodium hydroxide or soda lime.

It is a colourless liquid with a pungent odour; it becomes solid when cooled below  $0^\circ$ , and the crystals formed should not melt again below  $8^\circ$ . Specific gravity, 1.225; boiling-point, according to various authorities, is from  $98.5^\circ$  to  $105.5^\circ$ . When neutralised with sodium hydroxide, an excess of solution of mercuric chloride added, and the mixture warmed, the weight of mercurous chloride precipitated should correspond to 98 per cent. of formic acid. The acid should be free from chlorides, sulphates, and oxalates, and should yield no residue on evaporation. After dilution and neutralisation with sodium hydroxide, the solution should have no pungent or empyreumatic odour.

Formic acid resembles acetic acid in its action, except that it is more irritant and volatile. It has been employed as an aphrodisiac, but is useless for that purpose. It is generally administered in an alkaline aerated water, or in the form of alkaline formates. Formic acid for medicinal use is sold in aqueous solutions of various degrees of concentration. The strength of these solutions may be determined by titration, or by their specific gravity. The following strengths are usually found in commerce:—90 per cent. (s.g., 1.2), 80 per cent. (s.g., 1.18), 65 per cent. (s.g., 1.16), 50 per cent. (s.g., 1.12), 25 per cent. (s.g., 1.06).

*Dose.*—1 to 6 decimils (2 to 10 minims).

### ACIDUM GALLICUM.

GALLIC ACID.



Gallic acid,  $\text{C}_6\text{H}_2(\text{OH})_3\text{COOH}$ ,  $\text{H}_2\text{O}$ , is usually prepared by the hydrolysis of tannic acid.

It occurs in white or pale brown, odourless, silky needles or prisms. Slightly soluble in cold water (1 in 100), readily soluble in boiling water (1 in 3), also in alcohol (1 in 8), and glycerin (1 in 6). Dried at  $100^\circ$  it loses 9.5 per cent. of its weight. It should be free from sulphates, tannic acid, and mineral matter. Gallic acid gives a white precipitate with tartarated antimony, the official statement, to the effect that its aqueous solution is not precipitated by that compound, being incorrect.



Gallic acid does not combine with proteid, and has therefore no local astringent action similar to that of tannic acid. It is absorbed and excreted as sodium gallate, but much of it is oxidised in the tissues. It has been largely used as a remote astringent in cases of internal hæmorrhage, on the supposition that it induced vaso-constriction, but it does not constrict vessels. It has been used to a less extent in albuminuria and the night-sweats of phthisis; but there is no evidence to show that it exerts a beneficial action in these conditions.

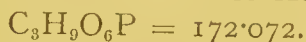
It is generally prescribed in mixture form, when it must be very finely powdered and diffused without the aid of a suspending agent, unless there is sufficient water to dissolve it in the cold. It may also be given in cachets, powders, or pills (massed with about one-tenth of its weight of glycerin). When given in powders, the acid is best mixed with twice its weight of sugar. It is incompatible with Spiritus Ætheris Nitrosi and metallic salts. Gallic acid enters into the composition of several compounds, such as bismuth subgallate (Dermatol), gallic acid anilide (Gallanol), gallic acid methyl ester (Gallicin), and dibrom-gallic acid (Gallobromol).

*Dose*.—3 to 10 decigrams (5 to 15 grains).

*NOTE*.—Glycerinum Acidi Gallici, B.P. 1885, was prepared by dissolving 1 part of the acid in 4 fluid parts of glycerin.

## ACIDUM GLYCEROPHOSPHORICUM.

GLYCEROPHOSPHORIC ACID.



*Synonyms*.—Glycerylphosphoric Acid; Monoglycerylphosphoric Acid.

Glycerophosphoric acid,  $\text{C}_3\text{H}_5(\text{OH})_2\text{OPO}(\text{OH})_2$ , is a mono-ester. It may be prepared by heating glycerin with phosphoric acid at a temperature between  $105^\circ$  and  $110^\circ$ , taking care that the latter point is not exceeded, as in that case the di-ester is formed in varying amounts, thus leading to discrepancies in the composition of the salts prepared from it.

It occurs in the form of a clear, colourless, or pale-yellowish, odourless, syrupy liquid, and has an acid taste. Soluble in water and in alcohol. Specific gravity, about 1.125 to 1.300. When heated with water it is decomposed into glycerin and phosphoric acid. It is used chiefly in the form of its salts, calcium glycerophosphate being the most important. The barium and strontium salts are prepared in a similar way to calcium glycerophosphate, while the lithium, iron, manganese, magnesium, zinc, sodium, potassium, and ammonium salts are best prepared from a solution of the pure barium salt, by exact precipitation with solutions of the sulphates of the respective metals, the filtrates being subsequently concentrated.

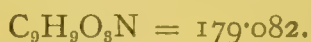
Glycerophosphoric acid occurs, combined with choline and fatty acids, as lecithin—in the yolk of eggs, the brain, bile, and nervous

tissue. The acid and its salts were introduced into medicine on the supposition that they could supply a deficiency of phosphorus in the brain, especially in nervous diseases. This speculation is controverted by all facts; the body cannot build up proteid from inorganic substances. The acid and its many salts act, according to Robin, as "nerve tonics," and their use has been advocated with doubtful success in all kinds of nervous and wasting diseases. After absorption they slightly increase the metabolism of the body, like most inorganic salts. The free acid may be given in aqueous solution; but more generally it is administered in combination with sodium, potassium, lithium, calcium, magnesium, strontium, iron, manganese, or quinine. These salts, in various combinations and proportions, are prescribed in syrups and similar preparations, such as Syrupus Glycerophosphatum Compositus and Elixir Glycerophosphatum, as well as in tablets, capsules, pastilles, and effervescent preparations. The glycerophosphates may also be used in the same way as hypophosphites in cod-liver oil and petroleum emulsions. The glycerophosphates are incompatible with carbonates and phosphates.

*Dose.*—3 to 6 decimils (5 to 10 minims).

### ACIDUM HIPPURICUM.

HIPPURIC ACID.



*Synonym.*—Benzamido-acetic Acid.

Hippuric acid,  $\text{C}_6\text{H}_5\text{CONHCH}_2\text{COOH}$ , is obtained from the urine of herbivorous animals.

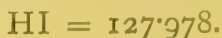
It occurs in colourless crystals. Slightly soluble in water (1 in 600), alcohol, and ether; also soluble in solution of sodium phosphate. Melting-point,  $187^\circ$ .

The hippurates have been employed with the object of lowering blood pressure, but recent experiments tend to show that they are practically without action. The conversion of benzoic acid into hippuric acid in the body (see Acidum Benzoicum) would partake, therefore, of the nature of a protective process, the hippurates being rapidly absorbed and having no toxic action.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

### ACIDUM HYDRIODICUM DILUTUM.

DILUTED HYDRIODIC ACID.



Potassium Iodide	...	...	...	...	13.50
Potassium Hypophosphite	...	...	...	...	1.00
Tartaric Acid	...	...	...	...	13.65
Alcohol (45 per cent.), a sufficient quantity.					
Distilled Water, sufficient to produce, by weight	...	...	...	...	100.00

Dissolve the potassium salts in 25 of the distilled water, with the aid of heat, and the tartaric acid in 40 of the alcohol, add the first solution to the second, shake the mixture briskly, and place the bottle containing it in a bath of ice-water for several hours; then filter through glass wool, wash the bottle and the crystalline precipitate with sufficient of the alcohol to produce 100, by weight, of clear solution, evaporate the liquid on a water-bath until all the alcohol has been dissipated, and add sufficient distilled water to make the product weigh 100. It should contain 10 per cent. by weight of real acid.

The diluted acid is a clear, colourless, odourless liquid, with an acid taste. Specific gravity, 1.109 (about 1.106 at 25°). The acid should be free from the heavy metals, arsenic, barium, and sulphates, and should not leave more than 1 per cent. of residue when the liquid is evaporated to dryness and the residue heated to 115°. The presence of a small proportion of hypophosphorous acid prevents colouration of the liquid on keeping.

Solutions of hydriodic acid may also be prepared by passing hydrogen sulphide into water in which iodine is suspended, and afterwards boiling off the excess of hydrogen sulphide, or by the action of phosphorus on iodine in the presence of carbon dioxide and water. The specific gravity of the commercial 10 per cent. acid is 1.085. A 10 per cent. solution of the acid may be prepared extemporaneously by dissolving 17 of potassium iodide in 58 of distilled water, mixing with a solution of 15 of tartaric acid in 59 of distilled water, setting aside for some time on ice, and filtering through glass wool. The product contains small quantities of acid potassium tartrate, and is known as Buchanan's hydriodic acid.

Diluted hydriodic acid has the general properties of iodine in weak combination (see Potassii Iodidi). It is given in the form of syrup, when the alkaline iodides disagree, and is specially suitable for children. The 10 per cent. solution is also used in medicine, but the acid is used chiefly in the form of Syrupus Acidi Hydriodici, in which it is present to the extent of 1 per cent. The acid may be obtained in a 20 per cent. solution (specific gravity, 1.17), but this tends to decompose, with liberation of iodine, especially when exposed to sunlight. The coloured acid may be rendered colourless by the addition of a minute quantity of hypophosphorous acid.

*Dose.*— $\frac{1}{2}$  to 2 mils (8 to 30 minims), well diluted.

*NOTES.*—Diluted hydriodic acid should be kept in small, completely filled-amber-coloured, glass-stoppered bottles, protected from light.

## ACIDUM HYDROBROMICUM DILUTUM.

DILUTED HYDROBROMIC ACID.

HBr = 80.968.

Hydrobromic acid, HBr, may be prepared by distilling potassium bromide and phosphoric acid, or by the action of bromine on phosphorus in the presence of water, or by the interaction of sul-



phurous acid and bromine, with subsequent distillation. The official solution contains 10 per cent. by weight of real acid dissolved in water.

It occurs as a clear, colourless, odourless acid liquid. Specific gravity, 1·077 (about 1·076 at 25°). The solution should be free from arsenium, barium, chlorides, phosphates, sulphates, and sulphites, and should leave no residue when evaporated to dryness.

Diluted hydrobromic acid possesses all the activity of the bromine ion (see under *Sodii Bromidi*), but its acidity renders it somewhat more irritant to mucous membranes. It is said to be less depressant than the other bromides, and to give rise to bromism less frequently; in reality it is a question of dosage, for the number of bromine ions contained in an average dose of hydrobromic acid is considerably smaller than that contained in an average dose of sodium or potassium bromide. The acid is sometimes given with quinine to prevent cinchonism, although its use for this purpose cannot be relied upon. It is incompatible with alkalis and their carbonates; also with metallic oxides, and salts of silver and lead. Fothergill's hydrobromic acid, prepared by mixing aqueous solutions of potassium bromide and tartaric acid, contained less than 10 per cent. of hydrobromic acid, with small quantities of acid potassium tartrate. Acids of the following strengths are found in commerce:—45 per cent. (s.g., 1·450), 40 per cent. (s.g., 1·375), 31·5 per cent. (s.g., 1·275), 30 per cent. (s.g., 1·260), 25 per cent. (s.g., 1·209), 20 per cent. (s.g., 1·163), 10 per cent. (s.g., 1·077).

*Dose.*—1 to 4 mils (15 to 60 minims).

*NOTE.*—Diluted hydrobromic acid should be kept in amber-coloured, glass stoppered bottles, protected from light.

## ACIDUM HYDROCHLORICUM.

HYDROCHLORIC ACID.

$\text{HCl} = 36\cdot458$ .

*Synonym.*—Spirit of Salt.

Hydrochloric acid,  $\text{HCl}$ , is prepared by the action of sulphuric acid on sodium chloride. The gas produced is dissolved in water, and the official solution contains 31·79 per cent., by weight, of real acid.

It occurs as a colourless, strongly fuming acid liquid, with a pungent odour. Specific gravity, 1·160. It should be free from arsenium, lead, copper, iron, aluminium, bromides, iodides, sulphates, sulphites, and free chlorine, and should yield no residue on evaporation. The commercial acid usually contains traces of arsenic, but an acid containing as little as 1 (or less) in 500000 can readily be obtained.

Strong hydrochloric acid is a powerful caustic; it does not penetrate the tissues so deeply as sulphuric or nitric acid, but produces a white stain, and this part afterwards sloughs. It is rarely used in therapeutics, but is occasionally employed for the production of a mixture or gargle (see *Gargarisma Chlori*) in which it is desired

to have free chlorine. In cases of poisoning by this acid, large draughts of water containing chalk, magnesia, or potassium carbonate should be given, followed by enemata of beef-tea and brandy.

NOTE.—Acidum Hydrochloricum, U.S.P., contains 31.9 per cent. by weight of real acid, and its specific gravity is about 1.158 at 25°.

## ACIDUM HYDROCHLORICUM DILUTUM

### DILUTED HYDROCHLORIC ACID.

Hydrochloric Acid ... .. 30.18

Distilled Water, sufficient to produce... .. 100.00

Dilute the acid with distilled water until the mixture, after it has been shaken, measures 100, at 15.5°. The product should contain 10.58 per cent., by weight, of real acid. Specific gravity, 1.052.

The diluted acids owe their acidity and their action to the presence of the hydrogen ion; diluted hydrochloric acid is the one most generally employed. Applied to the skin it is a mild astringent, and is sometimes employed to check sweating. In the mouth it induces a reflex flow of saliva, and it is this property which makes it of value in fevers and in other conditions where it is desired to allay thirst. In the stomach the simple acids have no direct action, but nevertheless they are invaluable in the wasting diseases of elderly people and especially in cancer of the stomach; in these conditions there is invariably some deficiency in the secretion of the normal hydrochloric acid of the stomach. In the duodenum the diluted acids induce the formation of secretin, a body which augments the secretion of the pancreatic juice. Hydrochloric acid is neutralised before absorption, and necessarily reduces the alkalinity of the tissues. The neutralisation is affected by ammonium salts, not by those of potassium and sodium. There is an increase in the nitrogenous excretion of the urine, which is entirely due to ammonia, for the urea is slightly diminished in amount.

Diluted hydrochloric acid is used in mixtures, lotions, and gargles. It is also employed as a solvent for quinine sulphate, in preference to sulphuric acid, the solutions being less fluorescent than when sulphuric acid is used. The acid is incompatible with alkalies, alkali carbonates, metallic oxides, and salts of silver or lead.

*Dose.*—3 to 12 decimils (5 to 20 minims).

NOTES.—Equal volumes of the official diluted hydrochloric, nitric, and sulphuric acids are equal in neutralising power. Acidum Hydrochloricum Dilutum, U.S.P., contains 10 per cent. by weight of real acid, and its specific gravity is about 1.049 at 25°.

## ACIDUM HYDROCYANICUM DILUTUM.

### DILUTED HYDROCYANIC ACID.

HCN = 27.018.

*Synonym.*—Prussic Acid.

Hydrocyanic acid, HCN, is prepared usually by distilling potassium ferrocyanide with diluted sulphuric acid. The gas produced is dissolved in water, and the official solution contains 2 per cent.,

by weight, of real acid. The diluted acid may also be prepared extemporaneously by mixing diluted hydrochloric acid, 14·6, with distilled water, 44·1, adding silver cyanide, 6, shaking the whole together in a glass-stoppered bottle, and pouring off the clear liquid when the precipitate has subsided.

It occurs as a colourless liquid, with a characteristic unpleasant odour. Specific gravity, 0·997. It should not contain more than traces of sulphates or chlorides, and should leave no residue when evaporated to dryness.

Diluted hydrocyanic acid is a powerful poison, and acts alike on all forms of living tissue. It is used in therapeutics on account of its depressant effect on sensory nerve-endings. Thus, dilute solutions (about 1 in 20) may be applied to the skin to relieve irritation and itching in such conditions as lichen and urticaria. Hydrocyanic acid is taken internally for its local action on the stomach, especially in gastrodynia and in the vomiting of pregnancy. Of more doubtful value is its employment in the treatment of cough, such as the dry hacking cough of phthisis, and whooping cough. As an inhalation it depresses the sensory nerve-endings in the bronchioles and pharynx, and may completely allay dry useless cough. Aqua Laurocerasi and Aqua Amygdalæ Amaræ each contain 0·1 per cent. of diluted hydrocyanic acid. As an inhalation  $\frac{1}{2}$  to 1 mil (8 to 15 minims) of the acid in cold water is prescribed. It is incompatible with copper, iron, and silver salts, mercuric oxide and sulphides. In cases of poisoning by hydrocyanic acid, artificial respiration should be resorted to; and the following mixture given as an antidote:— 6 decigrams (10 grains) of ferrous sulphate; 4 mils (60 minims) of tincture of ferric chloride, and 30 mils (1 fluid ounce) of water, followed by 12 decigrams (20 grains) of potassium carbonate, dissolved in 30 mils (1 fluid ounce) of water. Ammonia and brandy should also be given as stimulants.

*Dose.*—1 to 4 decimils (2 to 6 minims).

*NOTES.*—Diluted hydrocyanic acid should be kept in a cool, dark place, in small amber-coloured bottles, with well-fitting stoppers or corks, tied over with impervious tissue, the bottles being inverted. Argenti Cyanidum, U.S.P., as used for the extemporaneous production of diluted hydrocyanic acid, is a white, odourless and tasteless powder, containing not less than 99·9 per cent. of silver cyanide ( $\text{AgCN} = 133·94$ ).

## ACIDUM HYDROCYANICUM FORTIUS.

STRONGER HYDROCYANIC ACID.

$\text{HCN} = 27·018$ .

*Synonym.*—Scheele's Hydrocyanic or Prussic Acid.

Stronger hydrocyanic acid is an aqueous solution of hydrogen cyanide,  $\text{HCN}$ , prepared by distilling potassium ferrocyanide with diluted sulphuric acid, and passing the resulting gas into water. The product should contain 4 per cent. of real acid.

It occurs as a colourless liquid, with a characteristic unpleasant odour. Specific gravity, 0·994. It should not contain more than



traces of sulphates or chlorides, and should leave no residue when evaporated to dryness.

Stronger hydrocyanic acid is employed chiefly for poisoning animals. It is seldom used in medicine.

*Dose*.—5 to 15 centimils (1 to 3 minims).

*NOTE*.—Stronger hydrocyanic acid should be kept in a cool, dark place, in small, amber-coloured bottles, with well-fitting stoppers tied over with impervious tissue, the bottles being inverted.

## ACIDUM HYDROFLUORICUM.

HYDROFLUORIC ACID.

$\text{HF} = 20.008$ .

*Synonym*.—Fluoric Acid.

Hydrofluoric acid, HF, is prepared by the action of sulphuric acid on fluorspar. The gas produced is dissolved in water, and the solution usually contains about 30 to 40 per cent. of hydrogen fluoride, though crude fluoric acid for technical purposes is prepared of various strengths up to 55 per cent. The crude acid contains sulphuric, sulphurous, and fluosilicic acids; for use in medicine and as a chemical reagent the acid must be purified by redistillation, to remove silica and lead.

The acid occurs as a colourless fuming liquid which attacks glass strongly. The strength of the solution may be determined by adding it to excess of normal sodium hydroxide solution, and titrating back with sulphuric acid. Not more than 0.01 to 0.02 of residue should be left by the acid when volatilised in a platinum dish. It should be free from sulphates, chlorides, and arsenic, and should give no precipitate on the addition of solution of potassium chloride (absence of fluosilicic acid).

Hydrofluoric acid is an extremely powerful corrosive. In 0.1 per cent. solutions it prevents the growth of bacteria, and this fact was at one time thought to explain the immunity of glass-blowers from phthisis. Garcin treated phthisical patients by keeping them in an atmosphere containing the acid, and reported considerable success. If taken internally the acid exerts an extremely powerful local irritant effect and may completely destroy the mucous membrane. Administered by the mouth hydrofluoric acid is absorbed in the merest traces only; it causes death by shock following acute gastro-enteritis. The strong acid diluted five times has been used as an inhalation; the eyes should be well protected from the vapour. The greatest care should be taken to prevent the acid from coming in contact with the skin, as it may produce exceedingly painful and slow-healing sores after even a momentary contact.

*NOTE*.—Hydrofluoric acid should be kept in gutta percha or vulcanite bottles, or preferably in bottles made of, or coated internally with, ceresin or paraffin.

**ACIDUM HYDROFLUORICUM DILUTUM.**

## DILUTED HYDROFLUORIC ACID.

Hydrofluoric Acid	...	...	...	...	1.00
Distilled Water,	sufficient to produce	...	quantity	100.00	

Weigh the acid in a gutta percha or paraffin-coated bottle, pour it into distilled water, 100, and adjust the strength of the solution by adding more water, so that 10 mls require for neutralisation 10 mls of decinormal solution of sodium hydroxide, corresponding to 0.2 per cent. of real acid.

For internal use the dilute acid is administered in mixtures.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—Diluted hydrofluoric acid must be kept in similar bottles to those used for the stronger acid.

**ACIDUM HYPOPHOSPHOROSUM.**

## HYPOPHOSPHOROUS ACID.



Hypophosphorous acid,  $\text{HPH}_2\text{O}_2$ , may be prepared by dissolving 69.5 of barium hypophosphite (95 per cent.) in 313 of hot distilled water, adding slowly 148 of diluted sulphuric acid, and continuing the addition of acid, drop by drop, until no further turbidity is produced, The mixture is set aside in a warm place for one hour, then filtered, the precipitate washed with hot water until the washings have no longer an acid reaction, and the filtrate evaporated on a water-bath until its specific gravity is 1.1367 (about 1.130 at 25°). The product will contain 30 per cent., by weight, of hypophosphorous acid.

It occurs as a colourless, odourless, acid liquid. Its strength may be determined by volumetric solution of sodium hydroxide, using methyl orange as indicator. It should be free from barium, calcium, phosphates, and oxalates, and should not contain more than traces of sulphates. Heated with excess of mercuric chloride and a little hydrochloric acid, the weight of mercurous chloride precipitated should correspond to 30 per cent. of hypophosphorous acid.

Hypophosphorous acid, taken internally, is rapidly absorbed after neutralisation, and the whole can be recovered from the urine. It has been asserted that the hypophosphites exert an action on nutrition resembling that of phosphorus; and the salts are therefore sometimes administered in wasting diseases such as phthisis; but there is no evidence to show that they behave differently from other inorganic salts. The popular belief that they improve digestion and absorption is fallacious, any benefit derived is due to the iron or calcium with which the acid radical may be combined. Hypophosphorous acid is usually prescribed in the form of its salts, and enters into the composition of Syrupus Hypophosphitis Compositus.

*Dose.*—1 to 3 decimils (2 to 5 minims).

**ACIDUM HYPOPHOSPHOROSUM DILUTUM.**

DILUTED HYPOPHOSPHOROUS ACID.

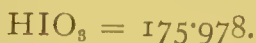
Hypophosphorous Acid	...	...	...	33.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dilute the acid with distilled water until the mixture, after it has been shaken, measures 100. The product should contain nearly 10 per cent., by weight, of hypophosphorous acid. Specific gravity about 1.05 (about 1.042 at 25°).

*Dose.*—3 to 10 decimils (5 to 15 minims).

**ACIDUM IODICUM.**

IODIC ACID.



Iodic acid,  $\text{HIO}_3$ , may be obtained by oxidising iodine with nitric acid.

It occurs in colourless crystals, easily soluble in water (2 in 1), insoluble in ether and alcohol. Heated to a temperature of 300°, it decomposes without melting. It should leave no residue on ignition. If a weighed quantity be dissolved in water and excess of solution of potassium iodide and diluted hydrochloric acid added, and the liberated iodine titrated with volumetric solution of sodium thiosulphate, 100 per cent. of iodic acid should be indicated.

Iodic acid has been employed to a small extent as a caustic in ophthalmic surgery for application to trachoma, ulcers of the cornea, etc. Iodates are more poisonous than the corresponding chlorates although they have less effect on the blood. Subcutaneous injections of 6 centigrams (1 grain) of sodium iodate are reported to have given relief in chronic articular rheumatism. A small quantity of free iodine is liberated in the body, and the value of the iodates probably depends upon this fact. The calcium salt is an antiseptic, and is used as a substitute for iodoform. The sodium salt is used for internal administration in the form of pills. Iodic acid is used externally either in solution ( $\frac{1}{2}$  to 10 per cent., according to the sensitiveness of the part affected) or in the form of ointment with a hydrous wool fat base (5 to 10 per cent.). Suppositories containing 16 milligrams ( $\frac{1}{4}$  grain) of the acid are made with theobroma oil. For application to the skin it may be used in the form of caustic points instead of in solution.

*Dose.*—1 to 2 decigrams ( $1\frac{1}{2}$  to 3 grains).

**ACIDUM LACTICUM.**

LACTIC ACID.



Lactic acid,  $\text{CH}_3\text{CH(OH)COOH}$ , is prepared usually by the fermentation of lactose and subsequent purification. The official



preparation is an aqueous solution, containing 75 per cent. of real acid.

It occurs as a colourless, syrupy, odourless and somewhat hygroscopic liquid. It mixes freely with water, alcohol, and ether; but is nearly insoluble in chloroform. Specific gravity, 1.21 (about 1.206 at 25°). The solution should be free from lead, copper, arsenium, iron, aluminium, calcium, chlorides, citrates, oxalates, phosphates, sulphates, tartrates, malates, sarcosylates, fatty acids, glycerin, gum, and sugars, and should not give more than a slight darkening with sulphuric acid. More accurate results than are yielded by the official titration process may be obtained by adding excess of alkali, boiling, and titrating back with acid, as lactone-anhydride is sometimes present in appreciable amount.

Lactic acid is employed as a mild caustic chiefly to destroy tuberculous ulcerations of the pharynx and larynx. It has also been employed as a local application to lupus and to diphtheritic membranes. The acid is used in the preparation of Syrupus Calcii Lactophosphatis. It is given internally in mixtures, in the form of the dilute acid, often with iron and calcium lactates, and is used as a spray (1 to 15) for the removal of the false membrane in diphtheria. The strong acid is used as a caustic, either in 50 per cent. solution or mixed with kaolin, for the removal of diseased tissues. In a more dilute form (30 per cent.) it has been recommended as an application in alopecia.

*Dose.*—1 to 3 mils (15 to 45 minims).

### ACIDUM LACTICUM DILUTUM.

#### DILUTED LACTIC ACID.

Lactic Acid	...	...	...	...	...	15.00
Distilled Water, sufficient to produce	...	...	...	...	...	100.00

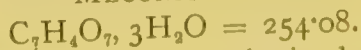
Dilute the acid with the water until the mixture, after it has been shaken, measures 100 at 15.5°. The product should contain 11.25 per cent. of real lactic acid. Specific gravity, 1.040.

Diluted lactic acid taken internally has a similar effect to the other diluted acids (see Acidum Hydrochloricum Dilutum). It is occasionally used in the treatment of atonic dyspepsia, diabetes, and vesical catarrh. Sometimes it produces pain in the joints, and it was believed at one time to be the cause of rheumatism.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

### ACIDUM MECONICUM.

#### MECONIC ACID.



Meconic acid,  $\text{HC}_7\text{H}_3\text{O}_7, 3\text{H}_2\text{O}$ , is obtained from opium.

It occurs in almost colourless crystals, slightly soluble in water, readily soluble in alcohol. The aqueous solution is acid in reaction,

and gives a red colour with ferric chloride, the colour being discharged by hydrochloric acid, but not by mercuric chloride (distinction from thiocyanate). It should be free from alkaloids.

Meconic acid has been described as a mild narcotic, but it has little or no physiological action, and is not now used medicinally. Its chemical reactions are of importance in toxicology as a valuable means of detecting the presence of opium.

## ACIDUM NITRICUM.

NITRIC ACID.



Nitric acid,  $\text{HNO}_3$ , is prepared by distilling potassium or sodium nitrate with sulphuric acid, and the official preparation is a strong aqueous solution, containing 70 per cent., by weight, of real acid.

It occurs as a clear, colourless, fuming liquid. Boiling-point,  $121^\circ$ . Specific gravity, 1.42. The acid should be free from lead, copper, arsenium, iron, chlorides, bromates, and iodates, but always contains sulphates. The official standard of not more than 0.005 per cent. of residue left on evaporation is also difficult of attainment.

Nitric acid is a powerful caustic and precipitates albumen, the precipitate being insoluble in excess of the acid. For this reason the caustic action is more localised than that of the other acids; it forms a convenient means of removing warts, small *nævi*, etc. It differs from sulphuric acid in that it stains the skin yellow, and does not char the tissues. It is more likely to influence the respiratory passages, as fumes are readily given off. In cases of poisoning by nitric acid the antidotes are the same as for hydrochloric acid. Nitric acid of other strengths is met with in commerce. Fuming nitric acid (specific gravity, 1.5), contains about 94 per cent. of real acid, and is usually of a reddish-brown colour, owing to the presence of some nitrous acid. An acid of specific gravity 1.35 contains 56 per cent. of  $\text{HNO}_3$ .

NOTE.—Acidum Nitricum, U.S.P., contains 68 per cent. of real acid, and its specific gravity is about 1.403 at  $25^\circ$ .

## ACIDUM NITRICUM DILUTUM.

DILUTED NITRIC ACID.

Nitric Acid	...	...	...	...	...	19.32
Distilled Water, sufficient to produce...	...	...	...	...	...	100.00

Dilute the acid with distilled water until the mixture, after being shaken, measures 100 at  $15.5^\circ$ . The product should contain 17.44 per cent., by weight, of real nitric acid. Specific gravity, 1.101.

Diluted nitric acid has a similar action to the other diluted acids (see under Acidum Hydrochloricum Dilutum). At one time it was thought to have a specific action on the liver, but this is erroneous. Diluted it may be employed to relieve itching in lichen, prurigo, etc. It is administered internally in mixtures, but is incom-

patible with all readily oxidisable substances, alkalies, carbonates, and sulphides.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTE.*—Acidum Nitricum Dilutum, U.S.P., contains 10 per cent. by weight of real acid, and its specific gravity is about 1·052 at 25°.

## ACIDUM NITRO-HYDROCHLORICUM.

### NITRO-HYDROCHLORIC ACID.

*Synonyms.*—Acidum Chloronitrosus; Aqua Regia; Aqua Regis.

Nitric Acid	...	...	...	...	25·00
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Hydrochloric Acid	...	...	...	...	75·00
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Mix the acids in a capacious vessel and, when all action has ceased, pour the product into dark amber-coloured vessels, which should not be more than half filled.

This acid is not used for medicinal purposes; it is employed chiefly in metallurgy and analytical chemistry.

*NOTES.*—Nitro-hydrochloric acid should be kept in a cool, dark place. Acidum Nitro-hydrochloricum, U.S.P., is prepared by mixing 18 of nitric acid (68 per cent.) with 82 of hydrochloric acid.

## ACIDUM NITRO-HYDROCHLORICUM DILUTUM.

### DILUTED NITRO-HYDROCHLORIC ACID.

Nitric Acid	...	...	...	...	9·38
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Hydrochloric Acid	...	...	...	...	12·50
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Distilled Water	...	...	...	...	78·12
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Mix the liquids, and set the mixture aside for fourteen days before using. The product contains free chlorine, hydrochloric, nitric, and nitrous acids. Specific gravity, 1·07.

This acid has a considerable reputation in the treatment of dyspepsia; it is also said to be a cholagogue, though proof of this action is wanting. It is often prescribed with a vegetable bitter as a "tonic" for those living a sedentary life. It is used externally as a lotion, as an addition to baths, and as an "acid bath," being applied for this purpose by soaking a flannel roller in the dilute acid (1 in 20), wringing it out, and using it in the form of a compress, covered with oiled silk. The acid is incompatible with alkalies, carbonates, sulphides, and the salts of silver and lead.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTES.*—Diluted nitro-hydrochloric acid should be kept in a cool, dark place. Acidum Nitro-hydrochloricum Dilutum, U.S.P., is prepared by mixing 4 of nitric acid (68 per cent.) with 18·2 of hydrochloric acid, and adding 78 of distilled water after effervescence has ceased. A stronger and more active preparation is obtained by this method of mixing.

## ACIDUM NUCLEICUM.

### NUCLEIC ACID.

*Synonyms.*—Nucleinic Acid; \*Nuclein.

Nucleic acid, as used in medicine, is prepared from yeast. It consists chiefly of the true nucleic acid of yeast, with a proportion



of albuminate (metaprotein) and carbohydrate. Other nucleic acids are known, notably those prepared from spleen pulp, from thymus gland substance, from salmon milt, and from pancreatic tissue. They are organic acids of unknown constitution; they yield, as dissociation products, phosphoric acid, pyrimidin derivatives and purin derivatives; amongst the latter, hypoxanthin, xanthin, adenin, and guanin. If yeast, spermatozoa, or pus cells be extracted with acids a residue is obtained which has been termed by Meischer nuclein. This residue is acid and contains a considerable amount of phosphorus. If the residue is further treated with alkalis or is subjected to tryptic digestion the proteid is split off, the nucleic acid which remains containing all the phosphorus.

The acid occurs as a greyish-white powder, insoluble in alcohol and ether, very slightly soluble in water and dilute acids, soluble in dilute alkalis and in potassium acetate solution. It is gradually decomposed on boiling with dilute acids, or even by heating with water, but is resistant towards the action of alkalis, especially if sodium or potassium acetate be present. It is acid to litmus, will decompose carbonates, and forms salts with metals.

The nucleic acids are amorphous bodies, and their alkaline solutions form precipitates with salts and mineral acids. One method of precipitating nucleic acid is that of Neumann, who digests the tissue containing nucleo-proteid with a solution containing 10 per cent. of sodium acetate and 1.65 per cent. of sodium hydroxide. The mixture is heated on the water-bath, filtered, evaporated and neutralised with acetic acid. The soluble sodium nucleate may then be precipitated with alcohol. The term "nuclein" is commonly used as a synonym of nucleic acid, but it is more correctly applied to the albumin nucleinates intermediate between nucleic acid and nucleo-proteid. A hydrolytic product of nuclein is known as thymic or thyminic acid, and is also supplied under the trade-name Solurol. It is a brownish-yellow, slightly deliquescent, amorphous powder, practically without taste, with a feebly acid reaction, and soluble in water. It is given in powders, compressed tablets, or cachets, and is best taken with or immediately following a meal. Thyminic acid is a uric acid solvent, capable of holding in solution practically its own weight of uric acid at 20° and one and a-half times its weight at blood temperature (37°). Solutions of the acid are said to have no incompatibles. The dose of thyminic acid is from  $2\frac{1}{2}$  to  $4\frac{1}{2}$  decigrams (4 to 7 grains).

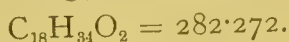
Nucleic acid is given internally in pills and cachets; solutions of its sodium salt (5 per cent.) are used orally and by hypodermic injection. Given in either of these forms, it increases the number of white blood corpuscles, and is thus an indirect bactericide in tuberculosis, endocarditis, septicæmia and other bacterial infections; it is also given to heal chronic and varicose ulcers. Nucleic acid is credited with some power to neutralise toxins present in the blood. It produces in tuberculosis a reaction similar to tuberculin, and raises the opsonic index to this and other specific organisms. In addition

to the sodium compound, nucleinates of silver, mercury and copper are prepared.

*Dose*.—Of powder, 6 to 30 centigrams (1 to 5 grains); of 5 per cent. solution, orally, 4 to 8 mils (1 to 2 fluid drachms); hypodermically, 1 mil (15 minims).

## ACIDUM OLEICUM.

OLEIC ACID.



Oleic acid,  $\text{HC}_{18}\text{H}_{33}\text{O}_2$ , is obtained by the saponification of fats, and separation of the liquid portions of the fatty acids obtained.

It occurs as a yellowish or brownish-yellow liquid with a peculiar lard-like odour and taste, and a slight acid reaction. Insoluble in water, readily soluble in alcohol, chloroform, or ether. It becomes semi-solid when cooled to  $4.5^\circ$  to  $5^\circ$ , melting again at  $13.3^\circ$  to  $15.5^\circ$ . Specific gravity, 0.890 to 0.910 (about 0.895 at  $25^\circ$ ). The acid should be free from more than traces of stearic or palmitic acid, but usually contains traces of iron, probably derived from the vessels in which it is stored.

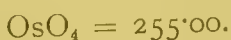
Oleic acid is employed externally as an emollient, but its principal use is in the preparation of the metallic oleates and as an alkaloidal solvent. It has recently been administered as a substitute for olive oil, and prescribed for internal use in capsules containing 1 mil (15 minims) as a remedy for gall-stones (see *Oleum Olivæ*).

*Dose*.—5 to 10 decimils ( $7\frac{1}{2}$  to 15 minims).

**NOTE**.—The oleic acid of commerce will not comply with the official tests.

## ACIDUM OSMICUM.

OSMIC ACID.



*Synonyms*.—Perosmic Acid; Osmium Anhydride or Tetroxide.

Osmic or perosmic acid,  $\text{OsO}_4$ , is obtained by the action of nitrohydrochloric acid on osmium or one of its lower oxides, and is more correctly known as osmium anhydride or tetroxide.

It occurs in yellow crystals, which are slowly soluble in water (1 in 50), also soluble in alcohol and ether, but the solutions decompose. Melting-point about  $40^\circ$ ; it boils below  $100^\circ$ . Its vapour, even at the ordinary temperature, is very irritating and extremely poisonous, attacking the eyes and lungs. It is decomposed by contact with any organic substance.

Osmic acid has been recommended as an injection in neuralgias—3 decimils (5 minims) of a 1 per cent. solution forming an average dose for injection into the tissues over the painful spots. The greater part of the acid is deposited as a black powder at the seat of injection. This treatment has resulted in the cure of lumbago, sciatica, etc. Osmic acid has also been injected into cancers, goitres, and

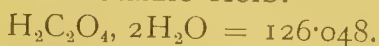
tuberculous glands, but without much benefit. Taken internally it is extremely irritant to the alimentary canal, causing diarrhœa and vomiting; after absorption it may produce nephritis. It has been given internally in the form of solution, or as potassium osmate in pills. It is sold usually in 1 and 2 per cent. solutions, being used for hardening animal tissues prior to cutting sections. The acid blackens fat and medullary matter. In cases of poisoning by osmic acid, hydrogen sulphide should be inhaled cautiously.

*Dose.*— $\frac{1}{2}$  to 1 milligram ( $\frac{1}{120}$  to  $\frac{1}{60}$  grain); hypodermically (1 per cent. solution), 12 to 60 centimils (2 to 10 minims).

NOTE.—Osmic acid should be preserved in sealed glass tubes.

## ACIDUM OXALICUM.

### OXALIC ACID.



Oxalic acid,  $\text{H}_2\text{C}_2\text{O}_4, 2\text{H}_2\text{O}$ , may be obtained by the direct combination of carbon dioxide with sodium at  $360^\circ$ ; by raising sodium formate quickly to a high temperature; by the oxidation of starch, sugar, wood, etc., by nitric acid; or by heating sawdust with potassium or sodium hydroxide. The product is subsequently purified by recrystallisation.

It occurs in large, colourless, transparent, monoclinic crystals, which effloresce in the air. Readily soluble in water (1 in 12), but less soluble in alcohol; sparingly soluble in ether, insoluble in chloroform, benzene, or petroleum ether. The hydrated acid melts in its water of crystallisation at  $98^\circ$ , and gradually becomes anhydrous, without melting, at a lower temperature. The anhydrous acid is volatile with partial decomposition at a temperature of about  $150^\circ$ . The commercial product may contain as impurities sodium, potassium, calcium, lead, sulphates, and organic matter. A pure acid may be prepared by evaporating a mixture of cane sugar and nitric acid of specific gravity 1.38, and crystallising the product. It should leave no residue when ignited on platinum foil.

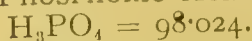
Oxalic acid has been used medicinally, but is not now used in therapeutics. Besides acting as an acid, it exerts the specific action of the oxalates. It is used chiefly for technical purposes, including the preparation of test and volumetric solutions, the commercial acid being purified for this purpose by recrystallisation. The antidotes in cases of poisoning by oxalic acid are milk of lime, saccharated solution of lime; lime water; chalk, whiting, or wall plaster, mixed with water. Alkalies, alkali carbonates, magnesia, and magnesium carbonate should not be given, neither should the stomach tube be used or emetics given unless the case be treated immediately after ingestion of the poison, as it is preferable that an antidote should be given, and evacuation brought about by means of castor oil or an enema.

*Dose.*—2 to 3 centigrams ( $\frac{1}{4}$  to  $\frac{1}{2}$  grain).



**ACIDUM PHOSPHORICUM.**

PHOSPHORIC ACID.



*Synonyms.*—Acidum Phosphoricum Concentratum; Concentrated Phosphoric Acid; Orthophosphoric Acid.

Phosphoric or orthophosphoric acid,  $\text{H}_3\text{PO}_4$ , is prepared by the oxidation of phosphorus, and the official preparation is an aqueous solution containing 66.3 per cent., by weight, of real acid. In commerce a stronger acid is met with (specific gravity, 1.75), containing about 90 per cent. of phosphoric acid. Glacial phosphoric acid consists chiefly of metaphosphoric acid,  $\text{HPO}_3$ , and is obtained by evaporating phosphoric acid until the residue forms a clear glassy mass on cooling; the commercial article contains usually a little sodium or ammonium metaphosphate, added to facilitate its preparation in clear sticks or slabs.

The official acid occurs as a colourless, syrupy, liquid. Specific gravity, 1.5. It should be free from lead, copper, arsenium, calcium, potassium, sodium, ammonium, chlorides, nitrates, metaphosphates, pyrophosphates, phosphites, and silica, and contain not more than slight traces of iron or sulphates. The acid cannot be determined by direct titration with alkali, as no indicator will show a sharp end-reaction.

Phosphoric acid is not given internally except in the diluted form. It undergoes dissociation to a less extent than the other inorganic acids, and is therefore less active. It can be given internally in larger doses without interfering with the digestive processes. It is commonly used to quench thirst and to increase the acidity of the urine. For the latter purpose it is much inferior to the acid sodium salt ( $\text{NaH}_2\text{PO}_4$ ). It has none of the therapeutic properties of free phosphorus. The acid is incompatible with alkalies and their carbonates, ferric chloride, lead acetate, and calcium salts.

*NOTES.*—Glacial phosphoric acid is used as a reagent for the detection of albumen in urine. Acidum Phosphoricum, U.S.P., contains 85 per cent. of real acid, and its specific gravity is about 1.707 at 25°.

**ACIDUM PHOSPHORICUM DILUTUM.**

DILUTED PHOSPHORIC ACID.

Concentrated Phosphoric Acid	...	...	15.00
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Distilled Water, sufficient to produce	...	...	100.00
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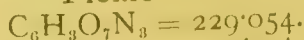
Dilute the acid with distilled water until the mixture, after being shaken, measures 100 at 15.5°. The product should contain 13.8 per cent., by weight, of real orthophosphoric acid.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTE.*—Acidum Phosphoricum Dilutum, U.S.P., contains 10 per cent. by weight of real acid, and its specific gravity is about 1.057 at 25°.

**ACIDUM PICRICUM.**

PICRIC ACID.



*Synonyms.*—Trinitro-Phenol; Carbazotic Acid; Picronitric Acid.

Picric acid,  $\text{C}_6\text{H}_2(\text{NO}_2)_3\text{OH}$ , is obtained by the action of nitric acid on phenol.

It occurs in yellow crystalline needles or scales. Soluble in water (1 in 50) and alcohol (1 in 10), and very soluble in ether. The aqueous solution has an acid reaction, a bitter taste, and a bright yellow colour, which is deepened by the addition of alkali. It stains the skin yellow. Melting-point,  $122.5^{\circ}$  when pure, but good commercial samples usually melt at  $120^{\circ}$  to  $121^{\circ}$ . It forms very insoluble compounds with many alkaloids. Picric acid should be soluble in 15 parts of boiling water, and not leave a globule of melted insoluble matter when so treated. The presence of adulterants is shown by incomplete solubility in 10 parts of alcohol or 25 parts of ether.

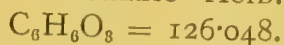
Picric acid is an irritant to the skin and mucous membranes. Taken internally it may produce nausea, vomiting, and diarrhœa; after absorption it stains the skin and mucous membranes a yellow colour, simulating jaundice. The urine is either yellow or red in colour, and may show signs of nephritis. Solutions of picric acid (1 in 200) have proved valuable in the treatment of burns and scalds and in acute eczema. It has also been employed internally in malaria and exophthalmic goitre, and as an antipyretic, but for these purposes it is inferior to other drugs. Occasionally it is used as a bitter tonic in 6-centigram (1 grain) doses; it should be given in the form of a mixture. Like most other organic nitro-compounds, picric acid is very explosive, and it forms, with alkalies, well-defined salts, which are also extremely explosive. Picric acid is used, in the form of a saturated aqueous solution, as a hardening agent in microscopical work, and it is also employed in urine analysis to detect the presence of glucose (Johnson's test), or for the approximate determination of albumen (Esbach's test), the formula for the reagent used for the latter purpose being as follows:—Picric acid, 1; citric acid, 2; distilled water, sufficient to produce 100.

*Dose.*—5 to 30 centigrams (1 to 5 grains).

*NOTES.*—The sale and storage of picric acid, picrates, and explosive mixtures containing them, are subject to legal restrictions, unless the substances are wholly in solution, an exemption being also made in the case of small quantities of picric acid if suitably stored. Solution of picric acid is prepared by dissolving 1 of the acid in sufficient distilled water to produce 150.

## ACIDUM PYROGALLICUM.

PYROGALLIC ACID.



*Synonym.*—Pyrogallol.

Pyrogallic acid,  $\text{C}_6\text{H}_3(\text{OH})_3$ , is a trihydroxyphenol, obtained by the action of heat on gallic acid.

The acid occurs in light, white, feathery or dense, hard crystals, which become discoloured on exposure to light and air. On careful heating it should sublime without residue. Melting-point,  $131^{\circ}$ . Readily soluble in water (1 in 2), alcohol, and ether. Its solution in water should be clear, colourless, and neutral. The

solution gives a green colour with solution of ferrous sulphate, a red colour with solution of ferric chloride, and rapidly turns black in contact with air and alkalies.

Pyrogallic acid is a powerful antiseptic in virtue of its affinity for oxygen. It is used as an ointment in chronic skin diseases such as psoriasis, and is of value as a parasiticide, the beneficial effects being due to its antiseptic and mildly irritant properties. In a more concentrated form it has been used to destroy lupus, epithelial cancers, etc. It has the disadvantage of staining the skin and hair black. Taken internally it exerts a toxic action on the blood, methæmoglobin is formed, passes into the plasma, and leaves the red corpuscles as granular debris. Jaundice and acute nephritis may follow, hence the drug is now very rarely taken, on account of its effects after absorption. When administered internally, it is given in the form of a watery solution, or in pills, which may be massed with a little simple syrup, and must be kept in a dark place. It is used in the form of an ointment (1 in 8 of lard, hydrous wool fat, or soft paraffin) for psoriasis. Unguentum Pyrogallol Compositum (Unna) contains pyrogallol, 5, salicylic acid, 2, ammonium ichtho-sulphonate, 5, soft paraffin sufficient to produce 100. Mixed with four times its weight of starch, the acid is applied as a powder to phagedenic chancres. In consequence of its toxic properties and of its effects upon the red blood corpuscles, even when applied externally, several allied compounds have been used as substitutes. The chief of these is the so-called pyrogallol oxide (see Acidum Pyrogallicum Oxidatum), which is formed when atmospheric air and ammonia vapour are allowed to act upon pyrogallol; other similar compounds are pyrogallol monoacetate (Eugallol), pyrogallol triacetate (Lenigallol), and pyrogallol disalicylate (Sali-gallol). These are sometimes substituted for pyrogallol in the various ointments, pastes, plasters, and varnishes of which it is an ingredient. Another preparation sometimes used in the place of pyrogallol is its derivative gallacetophenone (trioxyacetophenone).

*Dose.*—3 to 10 centigrams ( $\frac{1}{2}$  to  $1\frac{1}{2}$  grains).

*NOTE.*—Pyrogallic acid should be kept in well-closed amber-coloured bottles and not exposed to light.

## ACIDUM PYROGALLICUM OXIDATUM.

### OXIDISED PYROGALLIC ACID.

*Synonyms.*—Pyrogallol Oxidatum; Pyrogallol Oxide.

Oxidised pyrogallic acid is prepared by the action of air and ammonia on pyrogallol.

It occurs as a dark brown powder. Slightly soluble in water, but insoluble in absolute alcohol or ether.

Oxidised pyrogallic acid is used in the treatment of chronic skin diseases, such as eczema and psoriasis, generally in the form of an ointment. It has the advantage over pyrogallol that it does not



blacken the skin and is less liable to set up inflammation ; it is also more permanent and therefore much better adapted for use in plasters and soaps. Satisfactory results have been obtained in leprosy by the use of Unguentum Pyrogallol Oxidatum.

NOTE.—Oxidised pyrogallic acid is also known under the trade-name Pyraloxin.

## ACIDUM QUINICUM.

QUINIC ACID.



*Synonyms.*—Kinic Acid ; Chinic Acid.

Quinic or kinic acid,  $\text{C}_6\text{H}_7(\text{OH})_4\text{CO}_2\text{H}$ , is obtained from cinchona bark.

The acid occurs in colourless crystalline masses, easily soluble in water (1 in  $2\frac{1}{2}$ ), less soluble in alcohol (1 in 35), almost insoluble in ether. Melting-point,  $160^\circ$ .

Quinic acid may be given alone, or in combination with lithium, naphthamine, and piperazine, as quimates. It is used principally in the treatment of gout and the uric acid diathesis. It was employed first on the supposition that it combined with glycocoll in the body and prevented the formation of uric acid. Recent research has shown that it does not affect the excretion of uric acid, and, like so many of the "gout remedies" which are introduced into medicine, it will have to be discarded.

*Dose.*— $2\frac{1}{2}$  to 5 decigrams (4 to 8 grains).

## ACIDUM SALACETICUM.

SALACETIC ACID.



*Synonyms.*—Acetyl-salicylic Acid ; Salicyl-acetic Acid.

Salacetic acid,  $\text{C}_6\text{H}_4(\text{COOH})\text{OCOCH}_3$ , is prepared by the action of acetic anhydride or acetyl chloride on salicylic acid.

It occurs in colourless acicular crystals, or as a white crystalline powder. Slightly soluble in water (1 in 400), soluble in alcohol (1 in 5), ether, and chloroform. The aqueous and alcoholic solutions decompose on standing, salicylic and acetic acids being formed, and the reaction taking place very rapidly in alkaline solutions. Melting-point (when dry),  $135^\circ$ . The acid should leave no residue on ignition. If 1 decigram be dissolved in 5 mils of alcohol and 20 mils of water be added, and then 1 drop of dilute ferric chloride solution, a violet colour should not be produced immediately (absence of free salicylic acid).

Salacetic acid passes through the stomach unchanged, but is slowly decomposed by the alkali of the duodenum, salicylic acid

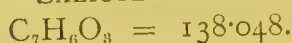
being liberated. It has therefore the same action as salicylic acid, and is prescribed frequently in place of salicylic acid and salicylates, because it is said to be much freer from objectionable secondary effects, such as gastric disturbance. It is best prescribed alone, in cachets, tablets, or powders, as it is decomposed by the water if given in aqueous mixtures. It should not be administered with alkaline substances. When given to children, it should be mixed with cold milk. Compressed tablets of salacetic acid frequently contain some free salicylic acid, produced by contact with water during manipulation; this may be avoided by the use of ethereal solution of theobroma for granulation.

*Dose.*— $\frac{1}{2}$  to 1 gramme (8 to 15 grains).

*NOTES.*—Salacetic acid is also known under the trade-names Acetysal, Aletodin, Aspirin, Saletin, Xaxa, etc. It should be preserved in well-closed bottles, and kept in a dry place.

## ACIDUM SALICYLICUM.

### SALICYLIC ACID.



Salicylic acid,  $\text{C}_6\text{H}_4\text{OHCOOH}$ , may be obtained from the oils of wintergreen and sweet birch, or by the action of carbon dioxide on sodium phenate, the commercial varieties being distinguished as "natural" and "artificial," according as they are produced from the natural salicylates or prepared synthetically.

It occurs in white prisms, or as white, light, silky crystals, the natural acid being usually less white than the artificial, and possessing a slight odour indicative of its origin. Slightly soluble in cold water (1 in 550), readily soluble in boiling water (1 in 9), alcohol (1 in  $3\frac{1}{2}$ ), or ether (1 in 2), less soluble in glycerin (1 in 200). It forms salicylates when dissolved in solutions of ammonium citrate, ammonium acetate, sodium phosphate, borax, alkali hydroxides and carbonates. Melting-point,  $156^\circ$  to  $157^\circ$ . It should be free from impurities which colour sulphuric acid; also from phenol, sulphocarbolates, and iron. The natural acid is free from impurities which are sometimes present in the synthetic product, and is still preferred for internal use. The artificial acid is sold in three varieties, (a) so-called physiologically pure, (b) ordinary crystals, and (c) powder; all three varieties usually comply with the official tests, but the powder is less pure than the crystals and has a slightly lower melting-point.

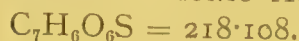
Salicylic acid is used externally as an antiseptic in the treatment of wounds and parasitic skin diseases; it is also used as a mouth-wash, and to diminish sweating, especially when offensive. In concentrated solutions it is employed to remove epidermal thickenings, corns, warts, etc., and to destroy the tissue of lupus. Upon micro-organisms it exerts a powerful inhibitory influence; a solution of 1 in 1,000 is sufficiently strong to preserve alkaloidal and similar solutions. It has also been employed ( $\frac{1}{2}$  to 6 in 1000) as a preserva-

tive for food and beverages. For internal use it has been replaced, almost entirely, by sodium salicylate, which it resembles in therapeutic action, except that it is a little more irritant to the gastric mucous membrane and renders the urine more acid. Externally, it is applied in the form of lotion (1 to 4 per cent. rendered soluble in water with borax), ointment, dusting powder (*Pulvis Salicylicus cum Talco*; *Pulvis Zinci Oxidi et Acidi Salicylici*), collodion (*Collodium Salicylicum*), gauze (4 per cent.), lint (4 per cent.), wool (4 per cent.), soap (5 per cent.), and plaster. Salicylic acid is incompatible with iron salts and spirit of nitrous ether.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

### ACIDUM SALICYL-SULPHONICUM.

SALICYL-SULPHONIC ACID.



*Synonym*.—Sulpho-salicylic Acid.

Salicyl-sulphonic acid,  $\text{C}_6\text{H}_3\text{SO}_3\text{H}(\text{OH})\text{COOH}$ , is prepared by heating together salicylic acid and sulphuric anhydride.

It occurs in small, colourless, needle-shaped crystals. Freely soluble in water and in alcohol. Melting-point,  $120^\circ$ . It gives a deep violet coloration with solution of ferric chloride.

Salicyl-sulphonic acid is an exceedingly delicate test for albumen in urine. If a few crystals be added to the clear urine and the mixture agitated, a turbidity indicates the presence of albumen. The precipitate of albumen, or globulin, is not affected by heat, while that due to albumoses or peptones is dissolved, but reappears on cooling.

### ACIDUM STEARICUM.

STEARIC ACID.

*Synonym*.—Stearin.

Stearic acid, the so-called "stearin" of commerce, is a mixture of solid fatty acids, stearic, palmitic, etc., obtained by the hydrolysis of various fats, and separation of the liquid acids by cooling and filtration.

It occurs in white, hard masses, showing signs of crystallisation, almost odourless and tasteless. Insoluble in water, slightly soluble in alcohol (1 in 50), readily soluble in ether and chloroform. Melting-point,  $56^\circ$  to  $65^\circ$ . Acid number, 200 to 210; ester number, 0 to 10; saponification number, 200 to 220. If stearic acid be warmed with a solution of an alkali carbonate, it combines with the alkali, and carbon dioxide is evolved. It should leave no residue on ignition. If 5 grammes be heated with 1 gramme of sodium hydroxide and 30 to 40 mls of alcohol until combined, and the solution evaporated to dryness with 20 grammes of sand that has been washed with hydrochloric acid, and the perfectly dry residue then extracted with



petroleum ether, the latter should leave only the slightest residue on evaporation (absence of paraffin). Stearic acid may be powdered by melting two parts with one part of absolute alcohol and rubbing in a mortar till cool. Pure stearic acid,  $C_{17}H_{35}COOH$  ( $C_{18}H_{36}O_2 = 284.288$ ), is obtained by recrystallising the commercial substance from hot alcohol. It occurs in white, shining, flaky crystals. Melting-point,  $69.2^\circ$ .

Combined with sodium carbonate, stearic acid is used as a basis for glycerin suppositories. It is also used for the preparation of stearates of some of the metals, such as copper and zinc, and of alkaloidal stearates, the latter being prepared by adding the free alkaloids to alcoholic solutions of the acid.

NOTES.—Stearic acid should be kept in a cool place, and not exposed to light. *Acidum Stearicum*, U.S.P., is the pure substance.

## ACIDUM SUCCINICUM.

SUCCINIC ACID.



Succinic acid,  $C_2H_4(COOH)_2$ , may be prepared by the destructive distillation of amber, or by the fermentation of tartaric acid, and is also obtained as a by-product of the fermentation of sugar.

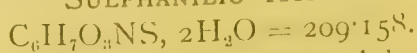
It occurs in colourless crystals, acid in taste, soluble in cold water (1 in 20), and in less than its weight of boiling water, soluble in alcohol (1 in 9), slightly soluble in ether. Melting-point,  $182^\circ$ . A solution, neutralised with ammonia, is completely precipitated by barium chloride on boiling, and the filtrate should give no precipitate with ferric chloride (absence of benzoic acid). After washing with hot water the precipitate may be dissolved by hydrochloric acid, and the barium precipitated with sulphuric acid.

This acid belongs to the same series as oxalic acid, but pharmacologically there is little resemblance between them. Succinic acid is neutralised in the duodenum, and is absorbed so slowly that sodium succinate acts as a saline cathartic in a similar manner to salts of tartaric (dihydroxysuccinic) acid. The portion absorbed is completely oxidised in the tissues. Succinic acid is seldom used in medicine.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

## ACIDUM SULPHANILICUM.

SULPHANILIC ACID.



*Synonyms.* — Para-amido-benzene-sulphonic Acid ;  
Anilosulphonic Acid.

Sulphanilic acid,  $C_6H_4NH_2SO_3H$ ,  $2H_2O$ , is prepared by heating together aniline and sulphuric acid.

It occurs in colourless crystals. Slightly soluble in water, insoluble in alcohol and ether. Decomposed on heating to  $280^{\circ}$  to  $300^{\circ}$ . It effloresces on exposure to the air.

Sulphanilic acid was advocated by Ehrlich as a treatment for iodism. He assumed that this condition was due to nitrites in the body setting free pure iodine in the respiratory passages and elsewhere; the sulphanilic acid was supposed to form a nitro-compound. It has been shown, however, that sulphanilic acid does not combine with nitrites in the animal body. It is a constituent of Ehrlich's diazo test for typhoid fever, now largely superseded by Widal's reaction. The acid is best prescribed in the form of the sodium salt, which can be obtained in a pure state.

*Dose*.—6 to 12 decigrams (10 to 20 grains).

### ACIDUM SULPHURICUM.

SULPHURIC ACID.



*Synonym*.—Oil of Vitriol.

Sulphuric acid,  $\text{H}_2\text{SO}_4$ , is produced by the oxidation of sulphur or sulphur compounds, and should contain 98 per cent., by weight, of real acid.

It occurs as a heavy, colourless, oily liquid, which evolves much heat on the addition of water. Specific gravity, 1.843. It should be free from arsenium, lead, copper, selenium, iron, ammonium, chlorides, nitrates, nitrites, and sulphites, and should leave no appreciable fixed residue on evaporation and ignition.

Sulphuric acid is a powerful caustic, charring organic substances by virtue of its affinity for water. It is seldom employed in therapeutics, but is occasionally used as a caustic mixed with sufficient wood charcoal to form a paste. In cases of poisoning by sulphuric acid, the antidotes are similar to those used for hydrochloric acid; magnesia, however, is better for neutralisation than chalk.

*NOTES*.—Nordhausen or fuming sulphuric acid, formerly prepared by distilling iron sulphate, is now prepared by the addition of sulphuric anhydride to sulphuric acid. It can be obtained containing various proportions of sulphuric anhydride. Acidum Sulphuricum, U.S.P., contains 92.5 per cent. by weight of real acid, and its specific gravity is about 1.826 at  $25^{\circ}$ .

### ACIDUM SULPHURICUM ALCOHOLISATUM.

ALCOHOLISED SULPHURIC ACID.

*Synonyms*.—Liquor Acidus Halleri; Aqua Rabeli.

Sulphuric Acid	...	...	...	...	...	25.00
Alcohol	...	...	...	...	...	75.00

Add the acid slowly to the alcohol, stirring meanwhile.

In this preparation, the sulphuric acid is present in combination, as ethyl-hydrogen sulphate (ethyl-sulphuric or sulphovinic acid). It is used, largely diluted with sweetened water, as a refrigerant tonic.

*Dose*.—1 to 6 decimils (2 to 10 minims).

**ACIDUM SULPHURICUM AROMATICUM.**

AROMATIC SULPHURIC ACID.

*Synonym.*—Elixir of Vitriol.

Tincture of Ginger	...	...	...	...	23·25
Spirit of Cinnamon	...	...	...	...	1·18
Alcohol	...	...	...	...	68·59
Sulphuric Acid	...	...	...	...	6·98

Add the acid slowly to the alcohol, stirring meanwhile, then add the tincture and the spirit to the mixture.

Aromatic sulphuric acid has been employed in such conditions as cholera, diarrhœa, internal hæmorrhage, and night-sweats. Its action resembles that of other dilute acids, plus the carminative effect of the aromatics. The aromatic odour of the preparation is in part due to the presence of a small amount of ethyl-hydrogen sulphate (ethyl-sulphuric or sulphovinic acid).

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTES.*—Acidum Sulphuricum Aromaticum, U.S.P., is prepared with 11·1 of sulphuric acid, 5 of tincture of ginger, 0·1 of oil of cinnamon, and sufficient alcohol (95 per cent.) to produce 100. It contains 20 per cent. by weight of real acid, and its specific gravity is about 0·933 at 25°.

**ACIDUM SULPHURICUM DILUTUM.**

DILUTED SULPHURIC ACID.

Sulphuric Acid	...	...	...	...	8·27
Distilled Water, sufficient to produce...	...	...	...	...	100·00

Add the acid gradually to 50 of distilled water, stirring meanwhile, then add distilled water gradually until, after shaking and cooling to 15·5°, it measures 100. The product should contain 13·65 per cent., by weight, of real sulphuric acids. Specific gravity, 1·094.

Diluted sulphuric acid has the typical effect of the diluted acids generally. It has a similar action and use to the aromatic acid, but is less agreeable. In the Potteries it is a constituent of a lemonade drunk as a prophylactic against lead poisoning, but it is probably of little use, since the lead sulphate which is formed in the tissues is sufficiently soluble to produce toxic effects. As a solvent of quinine sulphate, 7 decimils (12 minims) of diluted sulphuric acid is sufficient for 6 decigrams (10 grains) of the salt.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTE.*—Acidum Sulphuricum Dilutum, U.S.P., contains 10 per cent. by weight of real acid, and its specific gravity is about 1·067 at 25°.

**ACIDUM SULPHUROSUM.**

SULPHUROUS ACID.



Sulphurous acid,  $\text{H}_2\text{SO}_3$ , may be prepared by burning sulphur in air, and passing the resulting sulphur dioxide into water. The official solution contains 6·4 per cent. of hydrogen sulphite, or 5 per cent., by weight, of sulphurous anhydride,  $\text{SO}_2$ .



It occurs as a colourless liquid with a characteristic suffocating odour. Specific gravity, 1.025. It is never free from traces of sulphates, being readily converted into sulphuric acid by oxidation. Sulphurous acid should leave no residue on evaporation.

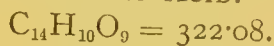
Sulphurous acid is a powerful antiseptic and disinfectant acting by reduction. It is a popular disinfectant for rooms, for which purpose sulphur is burnt in a moist atmosphere, but fumigation as usually effected is useless. For efficient disinfection from 3 to 6 pounds of sulphur should be burnt per 1000 cubic feet of air space and the room sealed up for about twenty-four hours. It is hardly necessary to point out that such quantities are not always used in practice. Liquefied sulphurous anhydride may be purchased for use as a disinfectant in glass syphons or sealed tin cans, 20 ounces by weight of the liquid being sufficient to disinfect 1700 cubic feet of air space. Sulphurous acid is used as a local application in parasitic skin diseases, for which purpose it is generally applied mixed with an equal volume of glycerin or water. It is given internally in cases of gastric fermentation, but unless freely diluted it is liable to cause intense irritation. For affections of the throat it is used (1 with 1 to 2 of water) as a spray or by means of a camel-hair mop. For inhalation add 4 mils (1 fluid drachm) to 600 mils (1 pint) of cold or tepid water. Sulphurous acid is incompatible with all oxidising agents.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*Notes.*—Sulphurous acid should be stored in completely filled, stoppered bottles, in a cool, dark place, as it is oxidised to sulphuric acid on keeping. Acidum Sulphurosum, U.S.P., contains 6 per cent. by weight of sulphur dioxide, and its specific gravity is about 1.028 at 25°.

## ACIDUM TANNICUM.

TANNIC ACID.



*Synonym.*—Tannin.

Tannic acid,  $\text{C}_{13}\text{H}_9\text{O}_7\text{COOH}$ , is a monobasic organic acid, obtained from galls. The official formula for tannic acid is  $\text{C}_{14}\text{H}_{10}\text{O}_9 \cdot 2\text{H}_2\text{O}$ , but according to the most recent work on the subject, tannic acid from galls is anhydrous.

It occurs as a light, yellowish or brownish powder, with a faint characteristic odour and a strong astringent taste. Very soluble in water (2 in 1), alcohol (10 in 6), and, slowly, in glycerin (1 in 3 or 1 in 1 on heating). Almost insoluble in pure ether, chloroform, and benzene. It should leave no residue on ignition. Many commercial samples contain gallic acid, the presence of which reduces the solubility of the tannic acid, and may be detected by the production of a pink colour on the addition of a 5 per cent. solution of potassium cyanide.

The properties of tannic acid depend upon its chemical interaction with proteids and gelatin. A solution of the acid added to

albumen or gelatin produces a dense precipitate, soluble in excess of albumen or gelatin, and in acids or alkalies. With connective tissue tannin forms an exceedingly insoluble compound (leather). The free acid only is astringent, and when it is neutralised by albumen or alkalies its astringent properties are lost. When taken by the mouth it gives the characteristic feeling of astringency, coagulates the proteid material surrounding the epithelium, and even penetrates some of the superficial cells. In the stomach it combines with alkalies and albumen to form tannates; tannate of albumen is digested like other coagulated proteid, the tannin being liberated and rendered free to recombine. Its presence in the small intestine, by coagulating proteids and diminishing secretions, tends towards constipation; it is therefore occasionally used in diarrhoea, though inferior to the crude vegetable drugs, such as kino, catechu, etc. In the alimentary canal it is converted into gallic acid, and absorbed as sodium gallate; it is apparently oxidised, as only a small portion, about 1 per cent., appears in the urine. The acid is sometimes placed on bleeding points with the object of coagulating the albumen and arresting hæmorrhage; it is used also as an application to inflamed mucous membranes, to diminish discharge, and to stimulate healing. It is of no value as a remote astringent, and cannot control any form of remote hæmorrhage.

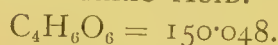
Tannic acid is given internally in the form of mixture, or it may be administered as a pill massed with equal parts of mucilage of acacia and glycerin, or in cachets. It is much more generally used for external application. As a styptic the powder may be applied, or a solution (5 per cent.) applied on lint. A convenient form is the Collodium Stypticum. For the throat the glycerin may be painted on, or the lozenges sucked, or a gargle or spray (from 1 in 80 to 1 in 40) may be employed. For insufflation the powder alone is used. One or 2 per cent. solutions are used as lotions and injections for various purposes, such as douching the nostrils, vagina, etc. It enters into the composition of dentifrices, and a solution in alcohol is used for applying to perspiring feet. A glyco-gelatin basis forms an insoluble compound with tannin, and suppositories, pessaries, and bougies should therefore be prepared with oil of theobroma. Tannic acid is sometimes given as an antidote in cases of poisoning by alkaloids, with the object of rendering insoluble such alkaloids as may still be in the stomach; it is also used as an antidote in cases of antimonial poisoning. It is incompatible with alkalies and their carbonates, salts of iron, lead, antimony, and silver, mineral acids, alkaloids, albumen, gelatin, chlorates, and lime water. Several synthetic compounds of tannin are preferred for internal use, especially when the action is to be directed to the bowels. Such are acetannin (Tannigen), tannin-albumin (Tannalbin), methyl-ditannin (Tannoform), tanno-gelatin (Tanocol), and albumin tannate (Honthin). They are decomposed slowly in the intestine, and their action is more prolonged.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

NOTES.—Some commercial varieties of tannic acid used in dyeing, in the manufacture of ink, etc., are not suitable for medicinal use; they are in coarse powder or lumps, darker in colour, and not always entirely soluble in water. Solution of tannic acid is prepared by dissolving 10 of the acid in sufficient distilled water to produce 100. It should be freshly prepared as required.

## ACIDUM TARTARICUM.

TARTARIC ACID.



*Synonyms.*—Dioxysuccinic Acid; Dihydroxysuccinic Acid.

Tartaric acid,  $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$ , is prepared from argol or other residues from wine making, or from acid potassium tartrate. It should contain 99 per cent. of hydrogen tartrate.

It occurs in colourless and odourless translucent crystals. Very soluble in water (1 in 1) and alcohol (1 in 3). It should be free from copper, lead, arsenium, iron, potassium, sodium, and oxalates, and contain not more than traces of calcium or sulphates. No darkening in colour should result on adding to 20 mls of an aqueous solution of tartaric acid (1 in 2), nearly neutralised with solution of ammonia, sufficient of a saturated aqueous solution of hydrogen sulphide to produce 100, and setting ~~solution of sodium hydroxide, 99 per cent. of hydrogen tartrate~~ aside for five minutes (absence of lead). The acid rarely yields less than 0.05 per cent. of ash on ignition.

Tartaric acid has the action common to all acids. It is neutralised in the intestine, and a small portion is absorbed; the greater part, however, passes through the alimentary canal as sodium tartrate, and acts as a saline aperient, tending to make the stools more watery. The portion absorbed is oxidised and excreted in the urine as carbonate, which renders the urine more alkaline. It is used to make drinks for febrile and diabetic patients. The following are the proportions of tartaric acid and various alkaline carbonates required to form neutral mixtures:—

Tartaric Acid, 10, will neutralise	Ammonium Carbonate .....	about 7
	(Freed from effloresced portions)	
	Magnesium Carbonate .....	8½
	Potassium Bicarbonate .....	13½
	Potassium Carbonate .....	9½
	(Anhydrous)	
	Potassium Carbonate .....	11
	(Commercial, $\text{K}_2\text{CO}_3 \cdot 1\frac{1}{2}\text{H}_2\text{O}$ )	
	Sodium Bicarbonate .....	11½
	Sodium Carbonate .....	5½
	(Anhydrous)	
	Sodium Carbonate .....	19
	( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ )	

Tartaric acid is incompatible with alkaline carbonates, vegetable astringents, and salts of potassium, mercury, calcium, and lead.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

NOTE.—Solution of tartaric acid is prepared by dissolving 12.5 of the crystalline acid in 65 of distilled water, adding 25 of alcohol, and making up to 100 with distilled water.



**ACIDUM TRICHLORACETICUM.**

TRICHLORACETIC ACID.



Trichloroacetic acid,  $\text{CCl}_3\text{COOH}$ , may be prepared by oxidising chloral hydrate with nitric acid.

It occurs as colourless, rhombic, deliquescent crystals with a slightly pungent odour. Very soluble in water, alcohol, and ether. Melting-point, about  $55^\circ$ ; boiling-point, about  $195^\circ$ . On warming with excess of solution of sodium hydroxide, chloroform is produced. It should be free from more than traces of chlorides. It may be titrated with standard solution of sodium hydroxide, using phenolphthalein as the indicator.

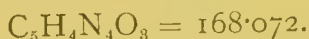
Trichloroacetic acid is applied as a caustic to the skin, and is less painful than nitric acid; it has also been employed in strong solutions as a caustic in chronic pharyngitis. Weak solutions, containing 1 per cent. or less, have a powerful disinfectant action, and such solutions may be applied to wounds and ulcers, or used in erysipelas and gonorrhœa, without causing irritation. It is rarely taken internally, but 2 to  $2\frac{1}{2}$  decigrams (3 or 4 grains) well diluted have been recommended in gastritis. Liquefied trichloroacetic acid is a liquid prepared by the addition of 10 per cent. of water to the crystalline acid.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

NOTE.—Trichloroacetic acid should be preserved in bottles with well-fitting glass stoppers.

**ACIDUM URICUM.**

URIC ACID.



Uric acid,  $\text{C}_5\text{H}_4\text{N}_4\text{O}_3$ , may be obtained from guano or from serpents' excrement.

It occurs in white crystals, very slightly soluble in water, insoluble in alcohol and ether, soluble in concentrated sulphuric acid and reprecipitated on dilution with water. It is decomposed without melting when heated. When a small quantity is mixed with nitric acid and the mixture evaporated to dryness, a yellow residue is left, which changes to violet on the addition of ammonia.

Uric acid is quite inactive. The presence of a large amount of uric acid in the body produces a tissue-necrosis, and this furnishes the conditions for its crystallisation.

*Dose.*—4 to 8 milligrams ( $\frac{1}{16}$  to  $\frac{1}{8}$  grain).

**ACONITI FOLIA.**

ACONITE LEAVES.

Aconite leaves are obtained from *Aconitum Napellus*, Linn. (N.O. Ranunculaceæ), a perennial plant growing in the mountainous

districts of Europe, Asia, and North America, and cultivated in England. Both the fresh leaves and flowering tops of the plant are used.

The leaves are stalked, roundish in general outline, and divided down to the leaf-stalk into three segments, each of which is subdivided into nearly opposite linear, acute tapering segments, the lower being the longest and somewhat spreading. The blue zygomorphic flowers are arranged in a raceme. The sepals are petaloid, and consist of a hooded or helmet-shaped upper sepal, and four smaller ones. Two of the five petals are hammer-shaped nectaries, concealed in the helmet-shaped sepal, the remaining three being much reduced, and quite inconspicuous. The stamens are indefinite. The fruit consists of three to five follicles.

Aconite leaves contain, when dry, from 0.2 to 0.6 per cent. of total alkaloid. The poisonous alkaloid aconitine is undoubtedly one of these, but the extent to which it occurs, and the nature of the other alkaloids that accompany it, are questions which have not yet been definitely answered. Probably both picraconitine and aconine are present. The leaves also contain aconitic acid, tannin, etc.

The properties of aconite leaves and flowering tops are essentially those of the alkaloid aconitine. A green extract (see *Extractum Aconiti*) was formerly official, but is now seldom used.

### ACONITI RADIX.

#### ACONITE ROOT.

Aconite root is the dried full-grown daughter root of *Aconitum Napellus*, Linn. (N.O. Ranunculaceæ), cultivated in England. It is freed from rootlets and dried, either entire, or longitudinally sliced.

The root is 5 to 10 centimetres in length, tapering in shape, and of a dark brownish colour. It should be crowned with the remains of a bud, and exhibit when broken a starchy section. It has no odour, but slowly develops, when cautiously chewed, a very characteristic numbing taste. The transverse section exhibits a narrow cortex, containing scattered sclerenchymatous cells, a wide parenchymatous bast-ring devoid of bast-fibres, a stellate cambium in the angles of which fibrovascular bundles are situated, and a wood consisting chiefly of thin-walled parenchyma. The cells contain numerous starch grains, but no calcium oxalate.

Aconite root contains three alkaloids, viz., aconitine, picraconitine, and aconine, but it is to the first named only that the toxic action of the root is due. The total amount of alkaloid present varies in good roots from 0.5 to 1.0 per cent., the greater portion of which is probably aconitine.

The properties of aconite root are virtually those of aconitine. For internal use, the tincture is employed well diluted, as a mild diaphoretic, to reduce the feverishness of common colds, and in such local inflammations as pneumonia, tonsilitis, and laryngitis.

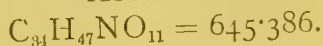
Very small doses frequently repeated are preferred to full doses to diminish the frequency and tension of the pulse. Preparations of aconite are not usually given when there is cardiac disease. Externally, liniment, compound liniment, and chloroform of aconite are used as anodynes in neuralgia and acute rheumatism. A strong tincture is prepared for external application, and is used with liniment of iodine to paint the gums in dental periostitis. Aconite plasters are prepared in rubber combination. In cases of poisoning by aconite, an emetic (apomorphine,  $\frac{1}{10}$  grain, hypodermically) should be employed, followed by stimulants, and the use of atropine and amyl nitrite.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

NOTES.—Aconite root is liable to attack by insects, and should be well dried and kept in securely closed vessels. Much of the aconite root at present in commerce is imported from Germany, and consists of the dried parent root of the flowering plants. It may be recognised by the remains of the aerial stem which crown the root; it is also generally less starchy, darker internally, and more shrivelled than the English, and is considered to be less active. Japanese aconite root is obtained from *A. Fischeri*, Reich., and is easily distinguished by its dark greyish colour, smaller size, smoother surface, and circular cambium; it contains japaconitine, which has an action similar to, but rather more powerful than, that of aconitine. Indian aconite (*bikhh* or *bish*) consists of the roots of *Aconitum laciniatum*, Stapf.; their large size and horny consistence sufficiently distinguish them from the official drug. It contains pseudaconitine, which is about twice as active as aconitine.

## ACONITINA.

### ACONITINE.



Aconitine,  $\text{C}_{34}\text{H}_{47}\text{NO}_{11}$ , is an intensely poisonous alkaloid obtained from aconite root.

It occurs in colourless crystals. Readily soluble in alcohol or chloroform, less soluble in ether, almost insoluble in water. Melting-point,  $195^{\circ}$ , when heated rapidly; if heated slowly it decomposes, and melts at  $182^{\circ}$ . Even in very dilute solution it produces a characteristic tingling sensation on the tongue. If 1 centigram be evaporated with  $2\frac{1}{2}$  decimils of fuming nitric acid, and the residue, after cooling, treated with alcoholic potassium hydroxide solution, no violet colour should be produced (difference from pseudaconitine and atropine). If a drop of potassium permanganate solution be added to a 0.1 per cent. aqueous solution of any soluble aconitine salt, a blood-red precipitate of aconitine permanganate results.

Aconitine has a very characteristic effect on sensory nerve endings. Applied to the tongue it produces a tingling sensation followed by numbness and, later, anæsthesia. It is not absorbed from the unbroken skin, but when applied with alcohol or fat the typical tingling followed by numbness is present. It is used as an ointment to relieve neuralgic pains. When it is taken by the mouth the same excitation of the sensory endings is induced, and this is



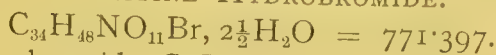
especially marked in the more sensitive parts of the body, such as the tongue, throat, and finger-tips. This action has led to its employment in trigeminal neuralgia. The medulla is first excited and then depressed. Hence, after small doses,  $\frac{1}{5}$  milligram ( $\frac{1}{300}$  grain), respiration is increased in depth and frequency, the pulse becomes slower and the peripheral vessels tend to constrict, but the blood pressure does not rise on account of the decided cardiac slowing. Very large doses quicken the heart and ultimately send it into the condition known as delirium cordis. Aconitine is sometimes used to reduce the temperature in fever. In cases of poisoning by this alkaloid, apply the treatment described under *Aconiti Radix*.

*Dose*.— $\frac{1}{10}$  to  $\frac{1}{5}$  milligram ( $\frac{1}{600}$  to  $\frac{1}{300}$  grain).

*NOTE*.—The official formula for aconitine,  $C_{33}H_{45}NO_{12}$ , has been proved, by investigation, to be incorrect.

### ACONITINÆ HYDROBROMIDUM.

ACONITINE HYDROBROMIDE.



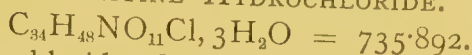
Aconitine hydrobromide,  $C_{34}H_{47}NO_{11}HBr, 2\frac{1}{2}H_2O$ , is a salt of an alkaloid obtained from aconite root.

It occurs in the form of white or yellowish crystals. Soluble in water and in alcohol. Melting-point,  $163^{\circ}$  to  $164^{\circ}$ , above which temperature it is said to be decomposed into acetic acid and picroaconitine. The aqueous solution is lævorotatory, and gives a blood-red crystalline precipitate when treated as described under *Aconitinæ Nitræs*.

*Dose*.— $\frac{1}{10}$  milligram ( $\frac{1}{600}$  grain).

### ACONITINÆ HYDROCHLORIDUM.

ACONITINE HYDROCHLORIDE.



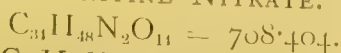
Aconitine hydrochloride,  $C_{34}H_{47}NO_{11}, HCl, 3H_2O$ , is a salt of an alkaloid obtained from aconite root.

It occurs in the form of white crystals. Soluble in water and in alcohol. Melting-point,  $149^{\circ}$ , above which temperature decomposition into acetic acid and picroaconitine is said to occur. The aqueous solution is lævorotatory, and gives a blood-red crystalline precipitate when treated as described under *Aconitinæ Nitræs*.

*Dose*.— $\frac{1}{10}$  milligram ( $\frac{1}{600}$  grain).

### ACONITINÆ NITRAS.

ACONITINE NITRATE.



Aconitine nitrate,  $C_{34}H_{47}NO_{11}, HNO_3$ , is a salt of an alkaloid obtained from aconite root. It may be prepared by suspending 10

of aconitine in 100 of water, neutralising with a 10 per cent. solution of nitric acid, evaporating the solution on a water-bath, and crystallising over sulphuric acid.

It occurs in the form of colourless, prismatic crystals; soluble in water and in alcohol; in boiling water (1 in 10). An aqueous solution containing a very small quantity of the salt (even 1 in 4000), faintly acidulated with acetic acid, will give a blood-red or purple crystalline precipitate of the sparingly soluble aconitine permanganate on the addition of a few drops of potassium permanganate solution; the mixture is not changed by the addition of a drop of bromine water, but in the case of cocaine and hydrastine, which give similar precipitates, the mixture becomes deep orange and bright yellow respectively.

Aconitine nitrate is the most stable salt of the base and the most useful to employ in the form of aqueous solution.

*Dose.*— $\frac{1}{100}$  milligram ( $\frac{1}{600}$  grain).

## ACORI CALAMI RHIZOMA.

CALAMUS RHIZOME.

*Synonyms.*—Calamus Root; Sweet Flag Root.

Calamus rhizome is obtained from the sweet flag, *Acorus Calamus*, Linn. (N.O. Aroideæ), a plant indigenous to Eastern Europe and Central Asia, but widely diffused by cultivation, and growing wild in England. The rhizome is collected in the autumn, trimmed, sometimes scraped or peeled, cut into pieces several centimetres in length, and dried.

The drug occurs in sub-cylindrical pieces, usually from 5 to 15 centimetres in length, and 12 to 25 millimetres in diameter. The unpeeled rhizomes are covered with a thin, brownish epidermis, and are deeply wrinkled longitudinally. The upper surface bears large triangular encircling leaf-scars, while the under surface exhibits an irregular zigzag line of small, rounded root-scars; the surface of the peeled rhizome is paler and slightly fibrous, the scars being less conspicuous. It breaks with a short fracture, and is nearly white and spongy internally. The transverse section exhibits a large stele and thick cortex. The drug has a sweet, aromatic odour, and a bitter pungent taste.

The chief constituent is a bitter aromatic volatile oil, present to the extent of 1.5 to 3.5 per cent. The drug also contains a bitter glucoside, acorin, which yields a bitter resin, acoretin, by oxidation. The rhizome is said to contain certain alkaloidal substances, but this statement requires confirmation. The chief aromatic constituent of the volatile oil is asaryl alcohol; eugenol, asarone, and other bodies have also been found in it.

Calamus rhizome has the action of an aromatic bitter. It is used to increase the appetite and benefit digestion. On account of the volatile oil which is present it also acts as a carminative, removing

the discomfort caused by flatulence and checking the growth of the bacteria which give rise to it. It may be given in the form of a fluid extract (1 in 1), as an infusion (1 in 10), and as a tincture (1 in 5). The essential oil is used for inhalations.

*Dose*.—1 to 4 grammes (15 to 60 grains).

## ADEPS.

### LARD.

Lard is the purified abdominal fat of the hog, *Sus scrofa*, Linn. (Order Ungulata), prepared from the "flare" or "omentum" by washing the flat leafy masses, if necessary, until free from any salt which may have been used as a preservative, removing external membranes as far as possible, and exposing the fat to the air for some hours, so as to remove all traces of water, and so render the lard less liable to become rancid and mouldy. The purified fat is then cut into small pieces, and reduced by pounding to a uniform mass, the whole put into a vessel surrounded by warm water, heated to a temperature not above 57° until the fat has melted, and strained.

It occurs as a soft, white, fatty solid of uniform consistence, neutral to litmus, having a faint but not rancid odour, and a bland taste; insoluble in water; soluble in ether (1 in 22), in oil of turpentine (1 in 16); readily in chloroform, carbon disulphide, and petroleum benzin; almost insoluble in alcohol. The chloroformic solution is clear if the lard be free from water; the solution in carbon bisulphide is slightly turbid. Melting-point, 38° to 40°, at which temperature, or a little higher, it forms a clear, almost colourless, liquid, without any separation of water. Specific gravity, 0.934 to 0.938 (about 0.917 at 25°, and about 0.904 at 40°), varying considerably according to age. Iodine value, 50 to 64. Saponification value, 195 to 203. The presence of cotton seed oil as an adulterant may be detected by heating 3 grammes of the lard in a salt-bath with 1 mil of amyl alcohol and 1 mil of a 1 per cent. solution of sulphur in carbon disulphide, when no reddish colour should develop in ten to fifteen minutes if the lard is pure. Lard should be free from sodium, chlorides, and starch. The limit of acidity is determined by dissolving 10 grammes in a mixture of equal volumes of chloroform and alcohol, adding 1 decimil of phenol-phthalein solution and 2 decimils of the volumetric solution of sodium hydroxide, which should produce a permanent red colour.

Lard consists of olein associated with variable amounts of stearin and palmitin, approximately 40 per cent. of stearin and palmitin, and 60 per cent. of olein. The olein, or lard oil, is separated on a commercial scale from the stearin, or solid portion, by pressure at a low temperature—about 0°. Exposed to air and moisture, lard rapidly becomes rancid, the rancidity being partly due to hydrolysis and partly to oxidation induced by the presence of fermentative



organisms. Commercial lard often consists of other hog fat than that obtained from the omentum, and should not then be used for making ointments, as the excess of olein present tends to separate, and the lard usually begins to melt below 36°.

Lard is a common basis for the preparation of ointments which are intended to be absorbed. It is most important that it should be free from rancidity, especially for such preparations as Unguentum Potassii Iodidi. In order to diminish its tendency to become acid it should be kept in the dark.

NOTE.—Lard deprived of a portion of its oil by pressure is sanctioned for use in India and the Colonies, where prevailing high temperatures render the official lard too soft for use in ointments and plasters: it is known as indurated lard (*Adeps Induratus*).

### ADEPS BENZOATUS.

BENZOATED LARD.

*Synonym.*—Benzoinated Lard.

Lard	...	...	...	...	...	...	100·00
Benzoin, in powder	...	...	...	...	...	...	3·00

Add the benzoin to the lard, previously melted on a water-bath, and continue the application of heat for two hours, stirring frequently; finally strain, and stir until cold.

The benzoic acid present in the benzoin acts as an antiseptic and prevents the benzoated lard from becoming rancid. The acid, however, renders the lard slightly irritant and makes it unsuitable for application to such sensitive parts as the conjunctiva.

NOTES.—*Adeps Benzoatus*, U.S.P., is prepared with only 2 per cent. of benzoin; the benzoated lard of the German Pharmacopœia contains 1 per cent. of benzoic acid, this addition being preferable to the use of benzoin.

### ADEPS LANÆ.

WOOL FAT.

*Synonym.*—Anhydrous Lanolin.

Wool fat is a purified cholesterin-fat obtained from the wool of the sheep, *Ovis aries*, Linn. (Order Ungulata), consisting of a very complex mixture of esters and free alcohols, among the latter being cholesterin, iso-cholesterin, etc. The natural grease is extracted from the wool by kneading with water, with which it readily forms an emulsion; on heating it separates as a distinct layer at the surface of the liquid. Purification is effected by repeated treatment with water in a centrifugal machine, or by some other suitable process.

It occurs as a light yellow, tenacious, fatty mass having a slight peculiar odour, and not readily becoming rancid. Insoluble in water; sparingly soluble in cold alcohol, more so in boiling alcohol (about 1 in 75), the hot alcoholic solution, on cooling, depositing most of the wool fat in the form of flocks; wool fat is readily soluble in chloroform, ether, carbon bisulphide, acetone, benzene, and petroleum ether. Melting-point, 40° to 44·4°. On ignition, wool fat burns with a sooty flame, leaving an ash which

should not exceed 0·3 per cent., and should have no alkaline reaction. If 10 grammes be dissolved in 25 mils of ether, and 1 decimil of phenol-phthalein solution be added, not more than 1 decimil of normal solution of sodium hydroxide should be required to produce a permanent red colouration (limit of acidity). If 1 gramme of wool fat be boiled with 20 mils of alcohol and the solution filtered after cooling, the filtrate should not be rendered turbid by the addition of a 5 per cent. alcoholic solution of silver nitrate (absence of chlorides). A distinctive test for wool fat is that for cholesterol—1 gramme of the fat dissolved in 3 or 4 mils of acetic anhydride and 3 decimils of sulphuric acid gives a pink colouration, soon changing to green and blue. When a 2 per cent. solution in chloroform is gently poured over the surface of concentrated sulphuric acid it gradually develops a purple-red colouration at the junction of the two liquids. If 10 grammes be heated with 50 mils of water on a water-bath the aqueous layer on filtration should not yield glycerin on evaporation, and when boiled with potassium hydroxide should not evolve the odour of ammonia (absence of nitrogenous organic matter). The saponification value of wool fat ranges from 90 to 102. It is practically impossible to saponify wool fat in aqueous solution of potassium hydroxide, but saponification may be effected by alcoholic potash under pressure; on evaporating the alcohol from the saponified liquid and dissolving the residue in water the cholesterolin may be extracted by means of ether; on evaporating the ethereal liquid the cholesterolin is left in the form of characteristic scaly crystals. Soft paraffin, being unsaponifiable, would be readily detected by the saponification test, and so also would glycerin fats by their much higher figures.

As wool fat forms an ointment basis which is closely allied to the natural secretions of the skin, and is readily absorbed, it is useful for promoting the cutaneous absorption of drugs, though it does not appear to promote the absorption of alkaloids. Unlike lard it does not become rancid. It takes up about 50 per cent. of water, and is thus available for use in ointments in which the proportion of water is too great to permit of incorporation with any other fatty base. By the addition of a small quantity of wool fat to soft or liquid paraffin, the latter can be formed into stable emulsions with water, as in the preparation of parenols.

### ADEPS LANÆ HYDROSUS.

HYDROUS WOOL FAT.

*Synonym.*—Lanolin.

Wool Fat ...	...	...	...	...	...	70·00
Distilled Water ...	...	...	...	...	...	30·00

Add the water gradually to the wool fat in a warm mortar, triturating constantly until a homogeneous mixture results.

Hydrous wool fat is employed as an ointment basis, generally for substances in aqueous solution. It may be mixed with olive oil, soft paraffin, or lard, by which additions its stickiness is much diminished,

**ADHATODA.****ADHATODA.**

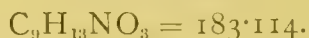
Adhatoda consists of the fresh or dried leaves of *Adhatoda vasica*, Nees (N.O. Acanthaceæ), a shrub growing in India.

The leaves vary from 10 to 15 centimetres in length, and are about 4 centimetres broad; they are opposite, entire, lanceolate, and shortly petiolate, tapering towards both apex and base. When dry they are of a dull brownish-green colour; odour characteristic, taste bitter. They possess well-marked histological features, which can easily be seen in fragments of the leaf cleared by chloral hydrate. The stomata are elongated-oval in shape and surrounded by two crescent-shaped cells, the long axes of which are at right angles to the ostiole. The epidermis bears simple one- to three-celled warty hairs, and small glandular hairs with a quadricellular secreting gland. Beneath the epidermis of the under surface cystoliths may be observed. Both the hairs and the cystoliths vary in number in different specimens of the drug.

The chief constituent of the leaves is a bitter, crystalline alkaloid, vasicine, which is said to exist in combination with an acid that has been named adhatodic acid. A second alkaloid has also been reported to be present, as well as an odorous volatile principle.

Adhatoda is an irritant to the alimentary canal, large doses causing vomiting and diarrhœa. It is used as an expectorant especially in chronic bronchitis, phthisis, and asthma; more rarely, in asthmatic conditions, the leaves are dried and smoked in the form of cigarettes. It is said to be non-poisonous to mammals, but to kill insects, other low forms of life, and fish. There are three preparations of adhatoda: a liquid extract (1 in 1), a juice obtained from the fresh leaves, and a tincture (1 in 8) prepared from the dried leaves.

NOTE.—Adhatoda is sanctioned for use in India and the Eastern Colonies.

**ADRENINA.****ADRENINE.**

*Synonyms.*—Epinephrine; Nephridine.

Adrenaline,  $\text{C}_6\text{H}_3(\text{OH})_2\text{CH}(\text{OH})\text{CH}_2\text{N}(\text{H})\text{CH}_3$ , is dioxyphenyl-ethanol-methylamine, a substance with feebly basic properties, obtained from the nephridium or suprarenal gland of the sheep or other animal; it may also be produced synthetically.

It occurs in commerce as a fine drab or buff coloured powder, which may show a distinct crystalline form when examined under the microscope. The synthetic product occurs as a buff crystalline powder. Adrenaline possesses a slightly bitter taste, and produces a temporary benumbing effect on the tongue. In dry form it is perfectly stable; on heating to  $205^\circ$  it turns brown, and at  $207^\circ$  it melts and decomposes. In contact with water it decomposes, slowly forming a brown solution, and it is also decomposed in the presence of alkalis. Insoluble or almost insoluble in ether or alcohol (1 in



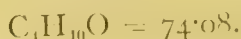
5000), but soluble in oleic acid, usually with a slight colouration due to the presence of traces of iron in the acid. The powder dissolves readily in water mixed with a trace of hydrochloric acid, forming a colourless solution, and it also dissolves easily in weak aqueous solutions of boric acid. If a very small quantity of dilute ferric chloride be added to a solution of adrenine, a beautiful emerald-green colour is developed, which by gradual addition of very dilute caustic alkali becomes purple and then carmine-red. Silver salts and chloride of gold are energetically reduced in alkaline solution, the liquid turning red. This colouration also occurs with oxidising agents, such as potassium ferricyanide and potassium bichromate. Fehling's solution is reduced on boiling. No precipitation is produced by potassio-mercuric iodide, mercuric chloride, potassium bichromate, platinum chloride, or picric, tannic, phosphomolybdic, and phosphotungstic acids. On treating a minute quantity of adrenine, or a drop or two of the 1 in 1000 solution, with 5 or 6 drops of solution of sodium hydroxide, in a small porcelain crucible, an odour resembling that of phosphoretted hydrogen is developed in a short time. This reaction is characteristic, and the presence of very minute traces of adrenine may be detected by means of it.

Injected into the circulation, adrenine produces a great rise of blood-pressure, which is brought about by the constriction of all vessels innervated by the sympathetic. As the drug reaches the heart, it enormously increases both the force and frequency of the beat; intravenous injection of adrenine has therefore been recommended in sudden cardiac failure. It is rapidly destroyed in the circulation, and its effects are therefore transient. When injected subcutaneously, adrenine gives rise to local constriction of the vessels. In the case of small doses no general systemic effect is produced. The drug is used subcutaneously, chiefly with local anæsthetics to reduce hæmorrhage in surgical operations and to prevent absorption and localise the effect of the anæsthetic. Applied locally to mucous membranes, adrenine blanches the part by constricting the peripheral vessels; it therefore arrests hæmorrhage and renders minor operations almost bloodless. Injected into the uterus, it arrests post-partum hæmorrhage, promoting contraction of the uterine muscle, and constricting the vessels. Adrenine is employed principally in the form of aqueous solutions containing small proportions of boric or hydrochloric acid (see *Liquor Adreninæ Boricus* and *Liquor Adreninæ Hydrochloricus*). An oily solution (1 in 1000) is prepared for nasal use, and ointments (1 in 1000 or 5000) and suppositories are prepared for rectal use in hæmorrhoids.

NOTES.—The blood-pressure-raising principle of the suprarenal gland is also known under the trade-names Adnephhrin, Adrenalin, Adrin, Epirenan, Hæmostasin, Hemisine, Paranephrin, Renaglandin, Renostypticin, Suprarenin, Suprarenalin, and Vasoconstrictine. Adrenalin, the preparation which has been mostly used in pharmacological research, is a drab-coloured powder; suprarenalin is an amorphous buff-coloured powder, and suprarenin is a light buff-coloured powder which appears distinctly crystalline when examined under the microscope, the crystalline form of the synthetic product differing from that of the natural substance.

**ÆTHER.**

## ETHER.



*Synonyms.*—Sulphuric Ether; Ethyl Oxide.

Ether is ethyl oxide,  $(\text{C}_2\text{H}_5)_2\text{O}$ , containing some water and alcohol. It is prepared by the action of sulphuric acid on ethyl alcohol, and should contain at least 92 per cent. by volume of ethyl oxide.

It is a colourless, mobile, volatile liquid, with a characteristic odour. Miscible in all proportions with alcohol, chloroform, fixed oils, and volatile oils. Boiling-point, below  $40\cdot5^\circ$ . Specific gravity,  $0\cdot735$ . Not more than 10 per cent. of ether should be dissolved by water when equal volumes of the two liquids are shaken together, any increase in the quantity dissolved indicating the presence of excess of alcohol. Ether should leave no residue on evaporation, be free from organic impurities that colour sulphuric acid, and have no action on solution of litmus.

Ether is employed for three distinct purposes: (1) as a local anæsthetic; (2) internally, for its action on the stomach and circulation, and (3) for inhalation as a general anæsthetic. As a local anæsthetic the ether spray is satisfactory for small and superficial operations; but damage to the tissues may follow prolonged freezing. As a general anæsthetic ether is only about one-fourth as toxic to the central nervous system as chloroform, and, judging from the death-rate under anæsthetics, it is about four times as safe as the latter. The cases of sudden death from vagal stimulation in the early stages of chloroform narcosis are unknown in ether narcosis. The disadvantages of ether are the time taken in inducing anæsthesia, the stage of excitement being especially prolonged; and its irritation to the bronchial mucous membrane, which renders it unsuitable for elderly people and children. Taken by the mouth ether has a narcotic action somewhat similar to that of alcohol, except that the intoxication comes on and passes away much more rapidly, so that a person may become intoxicated with ether and recover three or four distinct times in the day. In the stomach it acts as a carminative and reflexly excites the heart; but it has little or no direct action on either the heart or blood vessels. Ether is given in mixtures in the form of Spiritus Ætheris or Spiritus Ætheris Compositus, or in gelatin capsules containing 2 to 3 decimils (3 or 5 minims). It is applied by a spray as a local anæsthetic for minor surgical operations or for easing pain. Hypodermic injections of 1 to 2 mils (15 to 30 minims), are used as a restorative in collapse. For the production of general anæsthesia purified ether (specific gravity,  $0\cdot720$ ) is used. Ether is used as a menstruum for exhausting such drugs as male fern and capsicum, being a good solvent of their active principles. Ethereal solutions of atropine, menthol, iodine, etc., are readily absorbed by the skin.

*Dose.*—For repeated administration 5 to 20 decimils (10 to 30

minims); for a single administration 25 to 40 decimils (40 to 60 minims).

NOTE.—Æther, U.S.P., contains about 96 per cent. by weight of ethyl oxide, and its specific gravity is 0·716 to 0·717 at 25°.

## ÆTHER ACETICUS.

ACETIC ETHER.



*Synonym.*—Ethyl Acetate.

Acetic ether is ethyl acetate,  $\text{CH}_3\text{COOC}_2\text{H}_5$ , mixed with small quantities of alcohol and other substances, obtained by distilling ethyl alcohol, sulphuric acid, and dry sodium acetate, and purifying the product.

It occurs as a colourless liquid, with a characteristic fragrant odour. Soluble in water (1 in 10); miscible with alcohol, ether, and chloroform. Specific gravity, 0·900 to 0·905. Boiling-point, 73·9° to 77·8°. It should be neutral to litmus and not colour sulphuric acid, or leave any odorous residue when allowed to evaporate on filter paper.

Acetic ether resembles ether in its action; it is employed as a carminative or antispasmodic and diaphoretic, but is seldom given internally. For inhalation 2 mils (30 minims) are added to 600 mils (1 pint) of water. It is a constituent of Tinctura Ferri Acetatis, and is used as a solvent for cantharidin.

*Dose.*—For repeated administration 12 to 25 decimils (20 to 40 minims); for a single administration 4 to 6 mils (60 to 90 minims).

NOTE.—Æther Aceticus, U.S.P., contains about 90 per cent. by weight of ethyl acetate and its specific gravity is 0·883 to 0·885 at 25°.

## ÆTHER METHYLATUS.

METHYLATED ETHER.

Methylated ether is prepared by distilling a mixture of methylated spirit and sulphuric acid. It consists of ethyl oxide, methyl oxide, methyl-ethyl oxide, and varying amounts of water, alcohol, and other impurities.

It occurs as a colourless, light, volatile liquid, with the odour and properties of ether. Various qualities come into commerce, and are distinguished by their specific gravities, 0·717, 0·719, 0·720, 0·725, and 0·730 being usual. Those samples with the lower specific gravity contain less water and alcohol, and, as a rule, less of other impurities.

Methylated ether of specific gravity 0·717 is most suitable for local anæsthesia in the form of spray, owing to its low-boiling point and complete volatility. The less pure varieties of higher specific gravity which frequently leave an unpleasant smelling residue, not volatile on the water-bath, are only employed as solvents and for ice-making. Besides being well adapted for local anæsthesia, methylated ether of specific gravity 0·720 may be used for general anæsthesia, when purified so as to answer the tests for Æther Purificatus. Ordinary



methylated ethers are easily distinguished by the wide range of their boiling-point (due to the presence of methyl oxide and methyl-ethyl oxide). Methylated ether of specific gravity 0.720 will usually begin to boil at 25° to 30°.

### ÆTHER OZONICUS.

#### OZONIC ETHER.

Ozonic ether is a solution of hydrogen peroxide, prepared by shaking a strong solution of the peroxide with ether.

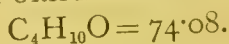
It occurs as a colourless, mobile, volatile liquid, which is not miscible with water, but mixes readily with alcohol. When treated with diluted sulphuric acid and solution of potassium permanganate in a nitrometer it should yield about five volumes of oxygen.

Ozonic ether is a more stable preparation than aqueous solutions of hydrogen peroxide, and is occasionally given in mixtures, solution being effected by the addition of alcohol in some form. The chief use of ozonic ether, however, is as a test for blood. If some freshly prepared tincture of guaiacum be added to a liquid containing traces of blood, the subsequent addition of ozonic ether causes the formation of a blue oxidation product of guaiacum, which colours the ethereal layer.

*Dose.*—1 to 4 mls (15 to 60 minims).

### ÆTHER PURIFICATUS.

#### PURIFIED ETHER.



Purified ether is ethyl oxide,  $(\text{C}_2\text{H}_5)_2\text{O}$ , nearly pure, prepared by washing and dehydrating ordinary ether.

It occurs as a colourless, mobile, volatile liquid with a characteristic odour. Miscible with alcohol, chloroform, fixed oils, and volatile oils. Specific gravity, 0.720 to 0.722. It should not begin to distil under 34.5° (absence of methyl ether). It should be free from excess of water, from methyl ether, aldehyde, acid, and hydrogen peroxide, but after exposure to light it will always give the reactions for the last-mentioned compound. When evaporated on filter paper no odorous residue should be left.

Purified ether is largely employed as a general anæsthetic, the use of ether being sometimes preceded by administration of nitrous oxide. It is a constituent of Dr. Harley's A. C. E. mixture (see Vapor Chloroformi Compositus).

### AGAR-AGAR.

#### AGAR-AGAR.

*Synonym.*—Japanese Isinglass.

Agar-agar is a gelatinous substance prepared from *Gelidium corneum*, Lam., *G. cartilagineum*, Gaill., *Sphaerococcus compressus*, Ag., and other Algæ (N.O. Rhodophycæ).

It occurs in transparent strips, about 6 decimetres long, and of the thickness of a straw, or more frequently in yellowish-white pieces, 3 decimetres long,  $\frac{1}{4}$  to  $2\frac{1}{2}$  centimetres thick, and upwards of  $2\frac{1}{2}$  centimetres wide. The latter variety is most suitable for the preparation of culture media for bacteria. It is odourless and tasteless, insoluble in cold water, soluble in hot water, the solution gelatinising on cooling. It consists of a carbohydrate, gelose, which is converted into galactose on boiling with diluted sulphuric acid. An aqueous solution gives no precipitate with solution of tannic acid (absence of gelatin), and no blue colour with solution of iodine (absence of starch).

Agar-agar is chiefly employed for preparing culture media, and has been recommended as a substitute for gelatin in making suppositories. For making a jelly for invalids, 1 part is dissolved in 200 of boiling water.

### AGROPYRUM.

AGROPYRUM.

*Synonyms.*—Couch Grass; Triticum.

Agropyrum consists of the dried rhizome of *Agropyrum repens*, Beauvois (N.O. Gramineæ), formerly known as *Triticum repens*, Linn., a weed abundant in Europe, N. Asia, Australasia, and America. The rhizome should be gathered in the spring, deprived of its roots and dried.

As met with in commerce it occurs in short, straight pieces, which are hollow, except at the nodes, about 3 to 6 millimetres long, and 2 to 2.5 millimetres broad, straw-coloured, and strongly furrowed longitudinally. The rhizome should be free from leaves and roots. It is devoid of odour, but has a faint, sweetish taste.

The constituents of the rhizome are glucose, mucilage, malates, tritacin (a gummy substance resembling irisin), and inosite. No starch is present and no definite active constituent has as yet been discovered.

Agropyrum is a demulcent diuretic, and is employed in the treatment of catarrhal diseases of the genito-urinary tract. It is given in the form of a decoction (1 in 20), and liquid extract (1 in 1).

NOTE.—Agropyrum is sanctioned for use in the Australasian, Eastern, and North American Colonies.

### ALCOHOL.

ALCOHOL.



*Synonyms.*—Spiritus Rectificatus; Rectified Spirit; Alcohol Ethylicum; Alcohol (90 per cent.).

Alcohol is obtained by the distillation of fermented saccharine liquids, and contains 90 per cent. by volume of ethyl hydroxide,  $\text{C}_2\text{H}_5\text{OH}$ .

It occurs as a transparent, colourless, mobile, volatile liquid, with a slight agreeable odour, and a strong burning taste. It consists of 85·65 per cent. by weight of ethyl hydroxide, and 14·35 per cent. by weight of water. Specific gravity, 0·834. Miscible with water in all proportions, also miscible with ether or chloroform. The spirit is inflammable, burning with a pale blue, smokeless flame. It is neutral to litmus, remains clear when mixed with water (absence of oily or resinous substances), yields no residue on evaporation (absence of fixed matter), and leaves no unpleasant smell when evaporated on clean filter paper (absence of fusel oil and allied impurities). It should be free from tannic acid, and from excess of amylic alcohol, aldehyde, and other organic impurities.

Diluted alcohol of different strengths may be prepared by mixing alcohol and distilled water in the proportions stated in the following formulæ, the volumes of alcohol and water specified in each case being sufficient to produce 100 volumes of the required mixture at 15·5°:—

1. Alcohol (70 per cent.)—

Alcohol	...	...	...	...	...	77·77
Distilled Water	...	...	...	...	...	24·16

Mix. The specific gravity of the resulting liquid is 0·890.

2. Alcohol (60 per cent.)—

Alcohol	...	...	...	...	...	66·66
Distilled Water	...	...	...	...	...	35·78

Mix. The specific gravity of the resulting liquid is 0·9135.

3. Alcohol (45 per cent.)—

Alcohol	...	...	...	...	...	50·00
Distilled Water	...	...	...	...	...	52·66

Mix. The specific gravity of the resulting liquid is 0·9436.

4. Alcohol (20 per cent.)—

Alcohol	...	...	...	...	...	22·22
Distilled Water	...	...	...	...	...	79·10

Mix. The specific gravity of the resulting liquid is 0·9760.

Alcohol (95 per cent.) can be prepared extemporaneously by mixing equal volumes of alcohol (90 per cent.) and absolute alcohol. Proof spirit (*Spiritus Tenuior*, s.g., 0·920) contains 49·24 per cent. of ethyl hydroxide, and spirits are described as so many degrees over or under proof (o.p. or u.p.), according to the quantity of distilled water which must be added to or deducted from 100 volumes, in order to produce spirit of proof strength. Alcohol (90 per cent.) corresponds very nearly to 58 over proof, and thus contains almost as much real alcohol as 158 volumes of proof spirit.

Methylated spirit is a mixture of 19 parts of alcohol of a strength of not less than 50 over-proof (about 86 per cent. alcohol) and 1 part of commercial wood naphtha. This article is supplied free of duty for manufacturing purposes only. For retail sale, "Mineralised Methylated Spirit" is supplied to licensed retailers, and consists



of the mixture described, with the addition of not less than  $\frac{3}{8}$  per cent. of petroleum oil or mineral naphtha, of specific gravity not lower than 0.800.

Diluted alcohol is used externally as an evaporating lotion in various forms of skin-inflammation; it is also employed to diminish sweating. It hardens the skin by dehydration, and is therefore employed to harden the nipples before lactation, and to prevent bed-sores. Internally it may be useful as a mild gastric stimulant and carminative; unquestionably it accelerates absorption, and may be administered with other drugs for this purpose. It depresses the central nervous system, and benefits which are obtained from its use in the various conditions known as nervous shock—conditions in which the brain may be already over-excited—are due to its depressant action and not, as has been said, to a stimulant effect. It has also been employed, especially in old age, as a hypnotic. As a circulatory stimulant the value of alcohol is undoubted; it increases the output of blood from the heart, and slightly raises blood pressure. It should be remembered, however, that it dilates the skin-vessels, and its use should therefore be avoided in those exposed to cold. Its action may be due either to a direct stimulant effect on cardiac muscle, or to the fact that it affords a readily assimilable source of energy. The most important action of alcohol is on metabolism; in ordinary doses it is almost completely oxidised, and spares the oxidation of fat. Moreover, in those moderately addicted to its use, it can, like fats and carbohydrates, replace a certain quantity of proteid; and it surpasses starch and sugar in alimentary value, since weight for weight it contains more energy. In excessive amounts it has a toxic action. It is employed as a food during convalescence from fevers, but when used for this purpose the dose should not exceed 3 or 4 ounces of alcohol per diem.

NOTES.—Alcohol should be kept in well-stoppered vessels, in a cool place, remote from lights or fire. Alcohol, U.S.P., contains 94.9 per cent. by volume of ethyl hydroxide, and its specific gravity is about 0.816 (or 0.809 at 25°). Alcohol Dilutum, U.S.P., is prepared by mixing equal volumes of alcohol (94.9 per cent.) and distilled water; it contains 48.9 per cent. by volume of ethyl hydroxide, and its specific gravity is about 0.936 (or about 0.930 at 25°).

## ALCOHOL ABSOLUTUM.

### ABSOLUTE ALCOHOL.



Absolute alcohol is ethyl hydroxide,  $\text{C}_2\text{H}_5\text{OH}$ , obtained by the dehydration and distillation of weaker spirit, and usually contains not more than 1 per cent. by weight of water.

It occurs as a colourless liquid with a characteristic odour. Specific gravity, 0.794 to 0.7969 (or 0.790 at 25°). Boiling-point, 78.5°. It should be free from excess of water, and from the impurities mentioned in the case of Alcohol.

Absolute alcohol is used in the preparation of Liquor Ethyl Nitritus and Liquor Sodii Ethylatis. It is of much value as a solvent and as a dehydrating agent, especially in microscopical technique.

## ALCOHOL AMMONIATUM.

### AMMONIATED ALCOHOL.

Ammoniated alcohol may be prepared by warming strong solution of ammonia, in a retort, to a temperature not exceeding  $60^{\circ}$ , cooling the gas produced in a condenser, washing the ammonia by passing it through a little alcohol, and then passing the washed gas into alcohol until the latter has increased in weight by about one-ninth. After titration with volumetric solution of sulphuric acid, the solution is diluted with alcohol until it contains 10 per cent. of ammonia.

It occurs as a colourless liquid, smelling of ammonia, and when diluted with water it should accord with the tests for purity given under Liquor Ammonia. Specific gravity, 0.808 to 0.810.

Ammoniated alcohol is used as a solvent in alkaloidal extractions. For filling smelling-bottles, a mixture of equal parts of alcohol and strong solution of ammonia, or 3 of alcohol and 1 of the solution, may be employed.

## ALCOHOL AMYLICUM.

### AMYL ALCOHOL.



*Synonym.*—Amylic Alcohol.

Amyl alcohol, so called, is a mixture of amyl and iso-amyl alcohols ( $\text{C}_5\text{H}_{11}\text{OH}$ ), with small quantities of other alcohols, obtained by purifying commercial fusel oil.

It occurs as a colourless liquid with a characteristic odour. Specific gravity, 0.8145 to 0.816. A clear mixture should be formed on adding to 10 mls of amyl alcohol, 10 mls of concentrated hydrochloric acid, and the addition of 1.5 mls of water to the mixture should produce a permanent turbidity.

Amyl alcohol has an action very similar to that of ethyl alcohol, but is a more pronounced local irritant. It is said to produce more deleterious effects in chronic poisoning than ethyl alcohol, but this statement is not based on satisfactory evidence, its importance depending on the fact that small quantities are present in most forms of spirit, especially when these are "raw," or freshly distilled.

NOTES.—Amyl alcohol should be free from furfural. The British Pharmacopœia allows the use of amylic alcohol distilling between  $125^{\circ}$  and  $142.8^{\circ}$ , but this is not very satisfactory for all analytical purposes, and it is sometimes better to employ samples that distil between  $128^{\circ}$  and  $132^{\circ}$ . Benzolated amylic alcohol is prepared by mixing amyl alcohol with three times its volume of benzol,

**ALCOHOL METHYLICUM.**

METHYL ALCOHOL.

*Synonym.*—Wood Spirit.

Methyl alcohol,  $\text{CH}_3\text{OH}$ , may be obtained by the destructive distillation of wood, and subsequent purification of the product, but one of the purest forms of methyl alcohol is that sold as "methyl alcohol from oil of wintergreen," which is obtained as a by-product in the manufacture of "natural" salicylic acid.

Commercial wood spirit, wood naphtha, or pyroxylic spirit, is a clear yellowish inflammable liquid consisting of methyl alcohol (60 to 90 per cent.), together with acetone, aldehyde, water, and other substances. Its specific gravity should not be below 0.840. The so-called "Alcohol Methyl. Pur." is colourless, has a faint but peculiar odour, a specific gravity of about 0.810, and boils at  $64^\circ$  to  $70^\circ$ . It is miscible with ethyl alcohol, ether, chloroform, and water, and dissolves fats and volatile oils. It usually contains about 1 per cent. of acetone. "Alcohol Methyl. Puriss." has a specific gravity of 0.796, and boils at  $65^\circ$  to  $66^\circ$ . Even this contains a trace of acetone, and when purified from this trace is known as "acetone-free." The latter is used as a solvent in certain blood-stains.

Methyl alcohol has been used as a narcotic and sedative, but it is rarely given internally.

*Dose.*—2 to 4 mls (30 to 60 minims).

*NOTE.*—Methyl alcohol must not be confounded with methylated spirit.

**ALDEHYDUM.**

ALDEHYDE.

*Synonym.*—Acetaldehyde.

Aldehyde,  $\text{CH}_3\text{COH}$ , is an oxidation product of ethylic alcohol. It is purified by converting it into aldehyde ammonia and distilling with sulphuric acid, being then known as absolute aldehyde.

It occurs as a colourless volatile liquid with a suffocating odour, and a tendency to become partly oxidised to acetic acid on exposure to air. Boiling-point,  $21^\circ$ ; specific gravity, 0.788 at  $16^\circ$ . Inhaled in concentrated form it causes excitement, anæsthesia, and, finally, asphyxia.

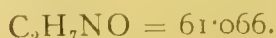
Aldehyde is used as an antiseptic in nasal catarrh and ozæna, being employed as an inhalation in the proportion of 1 part to 120 parts of water at  $60^\circ$ .

A solution of aldehyde in alcohol, containing 15 per cent. of the former, and known as Aldehydum Dilutum, is used when this substance is employed in medicine. The Aldehydum Concentratum of commerce contains about 30 per cent. of aldehyde.



**ALDEHYDUM AMMONIATUM.**

ALDEHYDE AMMONIA.



Aldehyde ammonia,  $\text{CH}_3\text{CH}(\text{OH})\cdot\text{NH}_2$ , may be prepared by passing aldehyde and pure dry ammonia into dry ether.

It occurs in colourless crystals, which become yellow on keeping, and have an irritating odour of aldehyde. It melts at  $70^\circ$  to  $80^\circ$  and boils at  $100^\circ$  without decomposition. It is immediately decomposed by acids, even carbonic acid, into aldehyde and the ammonium salt of the acid. Very soluble in water, almost insoluble in ether. It becomes brown on keeping.

Aldehyde ammonia is a convenient preparation for preparing standard solutions for the determination of aldehyde in potable spirits and other spirituous preparations.

NOTE.—Aldehyde ammonia should be kept in closely-stoppered bottles.

**ALDEHYDUM FORMICUM.**

FORMIC ALDEHYDE.



*Synonyms.*—Formaldehyde; Formin; Methyl Aldehyde.

Formic aldehyde,  $\text{CH}_2\text{O}$ , may be prepared by the distillation of calcium formate, and also by conducting the vapour of methyl alcohol over a platinum spiral heated to incandescence; on the industrial scale the platinum is replaced by coke heated to redness in a copper tube. The product contains unoxidised methyl alcohol which is distilled off, and the resulting solution concentrated until of 40 per cent. strength. If concentration is carried further, polymerisation occurs and paraform results. Formic aldehyde has not yet been obtained in a pure state.

It occurs as a colourless gas, and is used either in solution in water or as vapour. Its vapour is very irritating when inhaled. It reduces ammoniacal solution of silver nitrate. Digested with ammonia water the aldehyde is converted into hexamethyleneamine, from which it may be regenerated by distillation with diluted sulphuric acid. When boiled with alkalis it is converted into formic acid.

Formic aldehyde is a powerful germicide, though only slightly poisonous to the higher animals. As a germicide it is estimated to be equally effective with mercuric chloride, and it has the advantage of volatility, which enables it to penetrate more rapidly. It is employed chiefly in the form of Liquor Formaldehydi, which is diluted as required, a 0.5 per cent. solution being sufficiently strong to kill most micro-organisms. For the detection of formic aldehyde as a preservative in milk add to 10 mls of the milk about 2 mls of a 1 per cent. solution of phloroglucin in 25 per cent. alcohol made alkaline with soda; a red coloration indicates the presence of formic aldehyde.

**ALETRIS RHIZOMA.**

## ALETRIS RHIZOME.

*Synonyms.*—Colic Root; Starwort.

Aletris rhizome is obtained from *Aletris farinosa*, Linn. (N.O. Hæmodoraceæ), a small herb growing in the United States. The rhizome is collected after the plant has flowered.

The rhizome ranges from 1 to 3 centimetres in length and 3 to 9 millimetres in thickness. The upper surface is more or less densely covered with the fibrous remains of radical leaves, the under surface bears short, wiry rootlets or scars, where these have been broken off. It is pale brown in colour externally, straw coloured and paler internally. It breaks with a short fracture, the fractured surface being dense and waxy in the outer portion, but lacunous in the centre. It has a slight odour and a somewhat acrid bitter taste.

The chief constituent of the rhizome is a bitter principle, the nature of which has not yet been ascertained.

Aletris rhizome is used in the form of elixir and liquid extract as a uterine tonic. It has also been recommended as of service in chronic rheumatism and in dropsical conditions.

**ALOE.**

## ALOES.

*Synonyms.*—Barbados, Socotrine, and Cape Aloes.

Aloes consists of the liquid exuded from the leaves of various species of *Aloe* (N.O. Liliaceæ), evaporated to dryness. The leaf of the aloe plants is very fleshy and contains near the epidermis a row of fibrovascular bundles, the pericyclic cells of which are much enlarged and filled with a yellow juice, which exudes when the leaf is cut. This juice is collected and concentrated either by spontaneous evaporation, or, more generally, by boiling until it solidifies on cooling; it is then poured into boxes or other convenient receptacles. The manner in which the evaporation is conducted has a marked effect on the appearance of the aloes, slow and moderate concentration tending to induce crystallisation of the aloin, and thus causing the drug to appear opaque. Such an aloes is termed "livery" or "hepatic," and splinters of it exhibit minute crystals of aloin, when examined under the microscope. If, on the other hand, the evaporation is carried as far as possible, the aloin does not crystallise, and small fragments of the drug appear transparent; it is then termed "glassy," "vitreous," or "lucid" aloes, and exhibits no crystals of aloin under the microscope. The chief varieties of aloes are Curaçao (Barbados), Socotrine (Zanzibar), and Cape.

Curaçao aloes is obtained from *A. chinensis*, Baker. It was formerly produced on the island of Barbados, and is still frequently, but improperly, called Barbados aloes; it is now almost entirely made on the Dutch islands of Curaçao, Aruba, and Bonaire, by boiling the aloe juice down and pouring the viscid residue into empty spirit cases, in which it is allowed to solidify. Formerly gourds of

various sizes were used, but aloes in gourds is now seldom seen. It is usually opaque, or, as it is termed, "livery," and varies in colour from bright yellowish or reddish-brown to black or nearly black, the former being the most esteemed. It is not infrequently vitreous; small fragments are then of a deep garnet-red colour and transparent; it is then known as "Capey Barbados" and is less valuable, but may become livery and more valuable by keeping. Curaçao aloes possesses the nauseous and bitter taste that is characteristic of all aloes, and a disagreeable penetrating odour. The most important constituents are probably the two aloins, barbaloin and iso-barbaloin. The quantity of these present in the drug has been variously estimated at amounts ranging from 10 to upwards of 30 per cent. The drug contains in addition resin and water-soluble substances other than aloin, the proportion in which these are present being also very uncertain. The resin is a compound of aloë-resinotannol with cinnamic acid; the nature of the water-soluble substances other than aloin is unknown. The drug also contains traces of emodin, which is obtainable by the action of hydrochloric acid upon barbaloin. Curaçao aloes may be best identified by means of the cupraloin reaction. If 10 mils of an aqueous solution of aloes (1 to 1000) be mixed with 1 mil of a 5 per cent. solution of copper sulphate, 1 mil of a saturated solution of sodium chloride, and a few drops of hydrocyanic acid, a fine, deep, persistent, claret colour is rapidly developed. This reaction is due to the isobarbaloin contained in the drug, and is yielded by no other commercial aloes. In common with all other aloes, an aqueous solution of Curaçao aloes assumes a fine green fluorescence on the addition of borax. Solutions of Curaçao and other aloes gradually undergo change, and may after a month no longer react normally, at the same time losing their bitterness; this change is ascribed to a gradual hydrolysis of the aloin, and probably of other glucosidal bodies present in the drug. Curaçao aloes should be of a rich, livery, brown colour, and uniform fracture; it should be almost entirely soluble in 60 per cent. alcohol, and contain not more than 30 per cent. of substances insoluble in water, or 12 per cent. of moisture. It should yield not more than 3 per cent. of ash.

Socotrine aloes is prepared to a certain extent on the island of Socotra, but probably more largely on the African and possibly also on the Arabian mainland from the leaves of *Aloe Perryi*, Baker. It is imported usually in kegs in a pasty condition, and subsequent drying is necessary. It may be distinguished from Curaçao aloes by its different odour, and by the negative result of the cupraloin reaction. Much of the dry drug is characterised by the presence of small cavities in the fractured surface, but the variety of Socotrine aloes distinguished as Zanzibar often very closely resembles Curaçao in appearance. It contains barbaloin (formerly called socaloin and zanaloin), but no isobarbaloin; resin, water-soluble substances other than aloin, and emodin are also present, but the proportion in which these constituents are present is not definitely



known, the percentage of aloin being variously stated at from 4 to 10 per cent. No good positive test of identity is known for this variety of aloes, the best being the reddish-brown or yellowish-brown (not crimson colour) which it imparts to nitric acid. Socotrine aloes should be of a dark reddish-brown colour, and almost entirely soluble in alcohol. Not more than 50 per cent. should be insoluble in water, and it should yield not more than 3 per cent. of ash.

Cape aloes is prepared in Cape Colony from *Aloe ferox*, Miller. It is often preferred to other varieties on the Continent, but is chiefly employed in this country for veterinary purposes. Cape aloes almost invariably occurs in the vitreous modification; it forms dark-coloured masses, which break with a clean, glassy fracture, and exhibit in thin splinters a yellowish, reddish-brown, or greenish tinge. Its glassy appearance and very characteristic odour sufficiently distinguish it from other varieties of aloes. Confirmatory evidence may be found in the negative result with the cupraloin test and in the green coloration gradually produced with nitric acid. It contains barbaloin, but in what quantity is not accurately known; 6 per cent. has been obtained from it. The resin of Cape aloes consists of aloë-resinotannol combined with paracumaric acid. Cape aloes should not contain more than 12 per cent. of water; it should yield at least 45 per cent. of aqueous extract, but not more than 2 per cent. of ash.

Aloes is employed as a purgative. An ordinary small dose takes from fifteen to eighteen hours to produce an effect; this may be due to the fact that aloin itself is inactive but is slowly converted, in the bowel, into an amorphous body which induces the local irritation; its action is therefore delayed and is exerted mainly on the large intestine. The purgative action is increased by the addition of small quantities of iron, alkaline salts, or soap. It is one of the most valuable drugs in the treatment of chronic constipation. The pronounced action of aloes on the large intestine induces some pelvic congestion, and it is therefore employed as an emmenagogue. Preparations of aloes are rarely prescribed alone; they require the addition of carminatives to moderate the tendency to griping. The compound preparations of aloes in use generally contain such correctives, but powdered aloes and the extracts of aloes represent the crude drug. Aloes in one form or another is the commonest domestic medicine, and is the basis of most patent pills and of aperients generally. There is little to choose medicinally between the Barbados and Socotrine varieties, but the former is somewhat more powerful.

**Dose.**—1 to 3 decigrams (2 to 5 grains).

**NOTES.**—Other varieties of aloes (such, for instance, as the black "Mocha" aloes) occasionally find their way into the London market. Natal aloes is no longer a commercial article. Uganda aloes, imported from Mossel Bay (not from Uganda), is a variety of Cape aloes produced by careful evaporation, and yields about 6 per cent. of aloin; it occurs in bricks or fragments of hepatic yellowish-brown colour with a bronze-gold fracture, and its odour resembles that of Cape aloes. Aloe Purificata, U.S.P., is prepared by adding alcohol to melted aloes, stirring thoroughly, straining, and evaporating the strained liquid; the product occurs in irregular, brittle, dull-brown or reddish-brown pieces, and is almost entirely soluble in alcohol (95 per cent.).

**ALOINUM.**

## ALOIN.

Aloin is a crystalline principle found in aloes, and is obtained chiefly from Curaçao aloes.

It occurs as yellow, acicular crystals or crystalline powder without odour, but with the taste of aloes. Slightly soluble in cold water, more soluble in alcohol, almost insoluble in ether. It is rapidly decomposed in alkaline solutions, but not in neutral or acid solutions. If 1 drop of solution of copper sulphate be added to a dilute aqueous solution of aloin obtained from Curaçao aloes, a bright yellow colour will be produced; upon adding a few drops of a concentrated solution of sodium chloride the liquid will acquire a red colour, and upon the further addition of a little alcohol the colour will be changed to violet (distinction from nataloin and capaloin). The cupraloin test may also be applied as described in the case of Curaçao aloes. On shaking 1 gramme of aloin with 10 mls of benzene for one minute, and filtering, the filtrate should impart not more than a faint pink colour to an equal volume of a dilute solution of ammonia (5 per cent.) when shaken with it (limit of emodin).

Aloin acts in the same way as aloes; it has the disadvantage of being more easily absorbed than aloes, and has sometimes produced signs of renal irritation during excretion in the urine. It may be administered in the form of pills, cachets, or tablets, and is frequently combined with extract of nux vomica or strychnine, ferrous sulphate, myrrh, ipecacuanha, and extract of belladonna.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

**ALSTONIA.**

## ALSTONIA.

*Alstonia* consists of the dried bark of *Alstonia scholaris*, R. Brown (N.O. Apocynaceæ), a tree growing in India and the Philippine Islands, and of *A. constricta*, F. Mueller, growing in Australia, and known as Australian fever bark or dita bark.

The bark of *Alstonia scholaris* occurs in single quills, or in irregular curved pieces, and varies exceedingly in size and appearance. That from older stems or branches is commonly in small curved or channelled pieces, or quills, and is of a light, yellowish-brown colour, rough and irregularly fissured, and spongy externally; internally it is darker. Such pieces break with a short fracture, the section exhibiting a narrow inner portion (cortex and secondary bast), traversed by numerous fine medullary rays, and a spongy outer portion (cork), the extent of which varies in the various pieces of the drug. The bark from young branches bears scattered pale lenticels, and is very fibrous. Both kinds contain numerous pitted sclerenchymatous cells, laticiferous vessels, and prismatic crystals of calcium oxalate, but young bark contains abundant pericyclic fibres which are seldom visible in old bark. The drug has a bitter taste, but no odour.

The bark of *A. constricta* occurs in quills or channelled pieces, often of considerable size. The outer surface is brown or yellowish-brown in colour, and deeply fissured, both longitudinally and transversely, the inner surface being cinnamon-brown in colour, and coarsely striated. The transverse section exhibits an abundant dark brown cork, within which is a yellowish-brown layer (secondary bast); the latter exhibits under the microscope abundant bast fibres, in tangentially arranged groups. The drug has a very bitter taste, and yields a yellowish aqueous infusion, with a well-marked blue fluorescence.

The chief constituents of the bark of *Alstonia scholaris* are the alkaloids ditamine, echitenine, and echitamine. Ditamine, which is present to the extent of about 0.04 per cent., has the composition  $C_{16}H_{19}NO_2$ , and has been obtained as a bitter crystalline powder (melting-point,  $75^\circ$ ); echitenine,  $C_{20}H_{27}NO_4$  (melting-point,  $120^\circ$ ), is an amorphous bitter powder; echitamine or ditaine,  $C_{22}H_{28}N_2O_4$ ,  $H_2O$ , is a white powder, the crystals having the formula  $C_{22}H_{28}N_2O_4 \cdot 4H_2O$ . The following constituents have also been extracted from the bark:—Echicerin, a crystalline non-nitrogenous body; echicaoutchin, an amorphous substance resembling caoutchouc; echitin and echitein, both of which are crystalline, and echiretin, which is amorphous; all these constituents appear devoid of marked properties.

The chief constituents of the bark of *Alstonia constricta* are the alkaloids alstonine (chlorogenine),  $C_{21}H_{20}N_2O_4$ ,  $3\frac{1}{2}H_2O$ , and porphyrine,  $C_{21}H_{25}N_3O_2$  (?). It also contains porphyrosine and alstonidine, about which little definite is known. Porphyrine is amorphous and colourless, and shows a blue fluorescence in acid solution.

*Alstonia* is employed in India and the Eastern Colonies for malarial conditions. Its value in this respect cannot be compared with that of cinchona bark, although it produces no bad effects such as cinchonism. Occasionally it is employed as a bitter tonic and anthelmintic, and as a remedy in chronic diarrhœa. For administration the infusion (1 in 20) or the tincture (1 in 8) may be used.

NOTE.—The bark of *A. scholaris* and preparations made therefrom are sanctioned for use in India and the Eastern Colonies, while the use of the bark of *A. constricta* and its preparations is limited to the Australasian Colonies.

## ALTHÆA.

ALIHÆA.

*Synonym.*—Marshmallow Root.

*Althæa* is the dried, peeled root of *Althæa officinalis*, Linn. (N.O. Malvaceæ), a perennial plant, widely distributed in Central and Southern Europe. It is cultivated for medicinal use in Germany, France, and Belgium. The roots are collected in the autumn from plants not less than two years old, trimmed and scraped to remove the cork, and finally dried. They are sometimes split longitudinally, or cut into transverse slices.



The drug occurs usually in yellowish-white, straight, tapering pieces, from 10 to 15 centimetres long and 10 to 15 millimetres in diameter, bearing deep and broad longitudinal furrows. The surface is softly fibrous and bears the brownish scars of lateral rootlets. Internally the root is whitish and starchy. The transverse section exhibits a somewhat thick cortex, separated from the wood by a darker cambium line. On moistening the cut surface the radiate structure of both wood and cortex becomes visible, and cells containing mucilage can also be observed. The drug has a faint odour and a mucilaginous taste. It is occasionally limed to improve its appearance. Powdered marshmallow root is characterised by the presence of abundant bast fibres, starch grains, and mucilage cells. The bast fibres are long, narrow, and tapering, and have moderately thick walls; the starch grains are mostly simple and oval in shape, measuring  $4\mu$  to  $15\mu$  in length; the mucilage cells are stained deep red with a solution of ruthenium red and lead acetate.

The chief constituent of marshmallow root is mucilage, of which it is said to contain from 25 to 35 per cent. It also contains asparagin, starch, sugar, pectin, and a substance allied to lecithin.

*Althæa* is a demulcent and emollient. Taken internally it is a popular remedy for catarrhs and bronchitis. It has been applied to inflamed tissues as a fomentation (1 part of root to 5 parts of water), and has been recommended as an ointment in a variety of skin diseases. It may be given internally in the form of *Syrupus Althææ*, or as a decoction (1 in 20). Guimauve pastilles flavoured with neroli oil are a useful and pleasant demulcent. The powdered root is useful as a dry excipient in the making of pills which require some inert absorbent substance. Marshmallow ointment, properly so called, was prepared by heating marshmallow leaves with an equal weight of lard and straining, the product being employed for its soothing and emollient effects; the marshmallow ointment commonly sold, however, is simply a mild resin ointment, prepared without marshmallow.

## ALUMEN.

### ALUM.

*Synonyms.*—Potassium and Ammonium Alum.

Alum consists of aluminium potassium sulphate ( $\text{Al}_2(\text{SO}_4)_3, \text{K}_2\text{SO}_4, 24\text{H}_2\text{O} = 949.124$ ), or aluminium ammonium sulphate ( $\text{Al}_2(\text{SO}_4)_3, (\text{NH}_4)_2\text{SO}_4, 24\text{H}_2\text{O} = 906.908$ ), and may be prepared by crystallising solutions containing aluminium sulphate and potassium or ammonium sulphate respectively.

It occurs in colourless, transparent, octahedral crystals, with a sweet, very astringent taste. Soluble in cold water (1 in 11) and glycerin, insoluble in alcohol. It should be free from copper, lead, zinc, calcium, and sodium, and contain not more than a trace

of iron. Crude commercial powdered alum is incompletely soluble in water, and is not sufficiently pure for medicinal use.

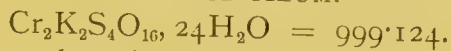
Solutions of alum precipitate albumins, the precipitate being soluble in excess of the proteid; the astringency of this and other salts of aluminium is due to this effect. They coagulate proteid on the surface of mucous membranes or on wounded surfaces. Alum is therefore used as a local astringent in such conditions as stomatitis (about 1 per cent.), pharyngitis (about 4 per cent.), leucorrhœa (about  $\frac{1}{2}$  per cent.), gonorrhœa (about  $\frac{1}{2}$  per cent.), and in skin diseases (about 1 per cent.). More occasionally it is employed to check diarrhœa and to stop bleeding from the nose or teeth. When taken internally the salts of aluminium are not absorbed. In small doses they exert an astringent action on the alimentary canal, more particularly the stomach; in larger doses they induce vomiting. Alum is used externally, as a styptic and for the relief and prevention of bed-sores, in the form of a lotion. *Alumen Exsiccatum*, in consequence of its power to absorb water, is serviceable as a mild caustic. Solutions containing from 0.5 to 2 per cent. are used in the treatment of purulent ophthalmia and as injections in the treatment of gleet, leucorrhœa, and for the purpose of destroying thread worms. Stronger solutions (1 to 4 per cent.) are used as a gargle or spray for a relaxed throat (usually in combination with tincture of myrrh or the acid infusion of roses), and as a mouth-wash. As an application to the mouth and throat the official glycerin of alum may be employed. Mixed with a small proportion of starch, alum is administered as a snuff to abort attacks of epistaxis or to mitigate chronic nasal catarrh. It is incompatible with alkalies and their carbonates, tannic acid, lime, lead, mercury and iron salts.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

*NOTE.*—Roche alum was originally a native alum, but is now prepared artificially by colouring crystals of alum with red bole.

## ALUMEN CHROMICUM.

### CHROME ALUM.



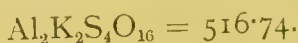
Chrome alum or chromium potassium alum,  $\text{Cr}_2(\text{SO}_4)_3, \text{K}_2\text{SO}_4, 24\text{H}_2\text{O}$ , may be prepared by the interaction of potassium sulphate and chromium sulphate.

It occurs in large purple octahedral crystals. Soluble in water (1 in 7), insoluble in alcohol. The solution in water is grey-blue in colour with a tinge of red, but if it be heated to  $60^\circ$  to  $70^\circ$  the colour changes to green; on standing for some weeks the solution returns to its original colour. It should give no reaction with the tests for copper, lead, zinc, aluminium, calcium, sodium, and ammonium, and give only the slightest reaction with the tests for iron.

Chrome alum is not used in medicine, but is employed largely in tanning and as a mordant in dyeing.

### ALUMEN EXSICCATUM.

EXSICCATED ALUM.

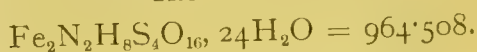


Exsiccated alum is potassium alum,  $\text{Al}_2(\text{SO}_4)_3, \text{K}_2\text{SO}_4$ , deprived of its water of crystallisation, by heating it in a porcelain dish or other suitable vessel until it liquefies, then heating it to a higher temperature until water vapour ceases to be given off, and the salt has lost from 45 to 46 per cent. of its weight. If, in drying, the alum be subjected to a heat above  $200^\circ$ , some sulphuric acid will be expelled, and the product will not be completely soluble in water, owing to the formation of insoluble aluminium oxysulphate.

Exsiccated alum is a very powerful astringent and is occasionally used to destroy exuberant granulations, as a mild escharotic for warty growths, an astringent for the gums, and as an insufflation in chronic nasal catarrh.

### ALUMEN FERRICUM.

IRON ALUM.



*Synonyms.*—Ferri et Ammonii Sulphas; Ammonio-ferric Alum; Ferric Ammonium Sulphate.

Iron alum,  $\text{Fe}_2(\text{SO}_4)_3, (\text{NH}_4)_2\text{SO}_4, 24\text{H}_2\text{O}$ , is prepared by adding ammonium sulphate to a boiling solution of ferric sulphate, stirring and setting aside until crystallisation takes place.

It occurs in octahedral crystals of a pale violet colour, has an acid astringent taste, and is efflorescent on exposure to air. Soluble in water (1 in 3), but insoluble in alcohol. It should contain 99.5 per cent. pure ferric ammonium sulphate and not less than 11.5 per cent. metallic iron. When strongly heated the crystals fuse, losing water of crystallisation and finally leave a pale brown residue. The aqueous solution reddens blue litmus. It should be free from aluminium and contain only traces of chlorides.

Iron alum is more astringent than the official alum, and also has the action of iron. It is employed internally to arrest hæmorrhage and as an astringent gargle (1 in 50). Its solutions deposit unless slightly acidified with dilute sulphuric acid.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

*NOTE.*—It has been stated that the colour of iron alum is due to the presence of traces of manganese.



**ALUMINII ACETO-TARTRAS.****ALUMINIUM ACETO-TARTRATE.**

Aluminium aceto-tartrate may be prepared by dissolving freshly precipitated aluminium hydroxide in a mixture of acetic and tartaric acids.

It occurs in colourless crystals or scales, or as a crystalline powder. Very soluble in water, insoluble in alcohol and ether.

Aluminium aceto-tartrate is less astringent, and therefore less active than alum, and may be used either in solution or as a dusting powder for antiseptic and mild astringent purposes, and is a powerful non-poisonous germicide. It has yet to be proved that this and analogous organic salts, such as the naphthol-sulphonate, salicylate, boro-tannate, etc., of aluminium, are better than the older preparations. Aluminium aceto-tartrate is said to be an excellent substitute in lotions for lead acetate, particularly when needed for affections of the eyes, when the strength should be about 0·2 per cent. An aqueous solution ( $\frac{1}{2}$  to 2 per cent.) of aluminium aceto-tartrate makes a useful gargle, mouth-wash, or douche, as well as an antiseptic lotion for wounds.

NOTE.—A preparation known under the trade-name Alsol is understood to be a 50 per cent. aqueous solution of aluminium aceto-tartrate.

**ALUMINII CHLORIDUM.****ALUMINIUM CHLORIDE.**

Aluminium chloride,  $\text{Al}_2\text{Cl}_6, 12\text{H}_2\text{O}$ , may be prepared by the action of barium chloride on a solution of aluminium sulphate, and subsequent crystallisation of the filtrate.

It occurs in the form of nearly white deliquescent crystals or granular crystalline powder. Very soluble in water.

For internal use, aluminium chloride should be dispensed in the form of mixtures. Pills are occasionally prescribed, but on account of deliquescence they are difficult to prepare and also to preserve. One process recommended is to rub with a little powdered althæa, and mass with Canada turpentine. A solution of aluminium chloride having a specific gravity of 1·244 is used as a disinfecting fluid. The salt is an excellent antiseptic, and is also used as an astringent in the form of gargle, mouth-wash, douche, spray, or pigment.

*Dose.*—1 to 2½ decigrams (2 to 4 grains).

NOTE.—Aluminium chloride must be kept in closely stoppered bottles.

**ALUMINII NAPHTHOL-SULPHONAS.****ALUMINIUM NAPHTHOL-SULPHONATE.**

Aluminium naphthol-sulphonate is a salt of  $\beta$ -naphthol sulphonic acid, containing the equivalent of 5 per cent. of metallic aluminium.

It occurs as a whitish powder. Very soluble in water; also soluble in alcohol or glycerin. It is precipitated from its solutions by albumen, but re-dissolved by excess.

Aluminium naphthol-sulphonate is used as an antiseptic and astringent lotion and gargle ( $\frac{1}{2}$  to 2 per cent.) in gonorrhœa, pharyngitis, and ozœna. It may be regarded as a typical example of the new astringent aluminium compounds which have been introduced into medicine in recent years by the manufacturing chemist. They are chiefly employed as dusting powders, but occasionally in solution. They precipitate albumen, and are therefore astringent, but there is no evidence to show that they are superior to the older preparations.

*Dose.*— $2\frac{1}{2}$  to 5 decigrams (4 to 8 grains).

NOTE.—This compound is also known under the trade-name Alumnol. Similar preparations are aluminium aceto-tartrate, boro-tartrate (Boral), boro-tannate (Cuto!), salicylate (Salumin), etc.

## ALUMINII SULPHAS.

### ALUMINIUM SULPHATE.



Aluminium sulphate,  $\text{Al}_2(\text{SO}_4)_3, 16\text{H}_2\text{O}$ , may be prepared by dissolving freshly precipitated aluminium hydroxide in diluted sulphuric acid, avoiding excess of either, and allowing the solution to crystallise.

It occurs as a white crystalline powder or in crystalline masses. Soluble in water (1 in 1), the solution having an acid reaction, insoluble in alcohol. Heated to  $200^\circ$  it loses its water of crystallisation. It should not contain more than traces of iron, and should be free from the other heavy metals, and from ammonia. If a filtered 10 per cent. solution be mixed with an equal volume of decinormal solution of sodium thiosulphate, it should not be more than faintly opalescent after five minutes (limit of free acid).

Aluminium sulphate has the same medicinal properties as the official alum, except that, as it contains more of the metal, its astringent action is somewhat more pronounced. It is given internally as an astringent in the form of mixture. A saturated solution is employed as a mild caustic for enlarged tonsils, nasal polypi, and various chronic enlargements. Solutions of from 5 to 10 per cent. are used as local applications to ulcers, and to stop foul discharges from mucous surfaces.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

## AMMONIACUM.

### AMMONIACUM.

Ammoniacum is a gum-resin obtained from the flowering and fruiting stem of *Dorema Ammoniacum*, D. Don (N.O. Umbelliferae),

and probably other species. The plants are widely distributed throughout Persia, extending into Southern Siberia. They are visited by numbers of beetles, which puncture the stem and thus cause an exudation of the milky substance contained in the numerous ducts situated in the cortex. Part of the secretion thus exuded dries on the stem, part falls to the ground and becomes mixed with earthy and other impurities.

The gum-resin occurs in commerce in two forms, tear ammoniacum and block or lump ammoniacum. The former, which is alone official, is composed of separate pale yellow tears or nodular masses varying in size from a pea to a small walnut. They are brittle when cold, but soften on warming; the fractured surface is milky white or pale brownish in colour, and is coloured orange-red by solution of chlorinated soda. Lump ammoniacum consists of particles of gum-resin agglutinated together with a bluish resinous substance. It is often admixed with stones, fragments of the stems, fruits, and other debris, and although largely used is not official. The drug has a characteristic but not strong odour, and a bitter acrid taste.

It contains volatile oil (1 to 2 per cent.), resin (65 to 70 per cent.), and gum. The resin consists of an indifferent resene, associated with ammo-resinotannol combined with salicylic acid. The gum resembles gum arabic and is probably an acid calcium arabate. The drug also contains traces of free salicylic acid, which may be detected by streaking the creamy emulsion made with water over filter paper containing traces of ferric chloride, when the usual reaction will be obtained. Tear ammoniacum of good quality should yield not less than 60 per cent. to alcohol and leave not more than 7.5 per cent. of ash when incinerated.

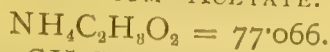
Applied externally ammoniacum acts as a slight irritant in virtue of the essential oil it contains. Taken internally it is of value in chronic bronchitis by facilitating expectoration, and especially in this the case in the aged, when the secretion is tough and viscid. The resin has a mild diuretic action. It is given internally as *Mistura Ammoniaci*, or in pills, of which there are two kinds official, namely *Pilula Scillæ Composita* and *Pilula Ipecacuanhæ cum Scilla*. It is generally prescribed for external use in the form of *Emplastrum Ammoniaci cum Hydrargyro*.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

*NOTES*.—African ammoniacum does not give an orange-red colour with chlorinated soda; it is not a commercial article. Galbanum is softer than ammoniacum, has a different odour, and yields the umbelliferone reaction (compare galbanum), as does also asafetida.

## AMMONII ACETAS.

AMMONIUM ACETATE.



Ammonium acetate,  $\text{CH}_3\text{COONH}_4$ , may be obtained by saturating glacial acetic acid with dry ammonia gas.



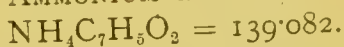
It occurs in white crystals or crystalline masses, which are very soluble in water. Melting-point,  $89^{\circ}$ . It is always acid to litmus, but should give no reaction with the tests for lead, copper, arsenium, iron, sulphates, sulphites, and chlorides, and leave no residue on ignition.

Ammonium acetate exerts the typical effects of a saline which is easily absorbed. It is a very mild diaphoretic and expectorant, and is much used in the feverish conditions of childhood. It is oxidised in the body to urea, and therefore slightly increases the flow of urine (see under Ammonii Chloridum and Potassii Acetas). The official preparation, Liquor Ammonii Acetatis, is the form in which this salt is usually prescribed, and for internal use it is greatly to be preferred to a solution of the salt, because it has a less disagreeable taste, owing to the carbonic acid gas retained in solution.

*Dose.*—6 to 20 decigrams (10 to 30 grains).

### AMMONII BENZOAS.

AMMONIUM BENZOATE.



Ammonium benzoate,  $\text{C}_6\text{H}_5\text{COONH}_4$ , is formed by the combination of benzoic acid and ammonia.

It occurs in white, scaly crystals, soluble in water (1 in 6), alcohol (1 in 22), and glycerin (1 in 8). It should leave no residue on ignition and be free from chlorides and sulphates. The salt usually has a feebly acid reaction.

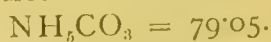
Ammonium benzoate has an action identical with that of sodium benzoate, except that it is more rapidly absorbed. It is largely employed in chronic bronchitis, and is said to be most beneficial in cases in which the mucus is tenacious and difficult to remove by coughing. At one time benzoic acid and its salts were much employed in the treatment of gout and allied conditions; this treatment, which is now obsolete, was based on the incorrect supposition that benzoic acid, by forming hippuric acid in the body, lessened uric acid secretion and dissolved uric acid deposits. The benzoate is usually given in mixtures. It is incompatible with acids, fixed caustic alkalies, and ferric salts.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

*NOTE.*—There are two commercial varieties of this salt, made from natural and synthetic benzoic acids respectively.

### AMMONII BICARBONAS.

AMMONIUM BICARBONATE.



Ammonium bicarbonate,  $\text{NH}_4\text{HCO}_3$ , may be obtained by treating commercial ammonium carbonate with alcohol, when the carbonate is dissolved and the bicarbonate remains behind undissolved; it

may also be prepared by the action of carbon dioxide on commercial ammonium carbonate. It sometimes occurs in a crystalline condition in "Patagonian guano" and in the purifiers of gasworks.

It occurs in white friable masses or powder or in white rhomboid crystals with but little odour of ammonia, and not so caustic in taste as the carbonate. It is slowly decomposed on heating to  $60^{\circ}$  into ammonia, water, and carbon dioxide. Soluble in water (1 in 8), insoluble in alcohol.

Ammonium bicarbonate may be used as a stimulant in place of ammonium carbonate. It is less caustic in taste, and is specially suitable for use in effervescing draughts.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

*NOTE.*—Ammonium carbonate is gradually converted into the bicarbonate when exposed to the air.

### AMMONII BROMIDUM.

AMMONIUM BROMIDE.



Ammonium bromide,  $\text{NH}_4\text{Br}$ , may be prepared by the action of bromine on solution of ammonia, and subsequent evaporation, or by the combination of hydrobromic acid and ammonia; also by the action of ammonium carbonate on iron bromide solution.

It occurs as colourless crystals or as a white crystalline powder. Very soluble in water (2 in 3), less soluble in alcohol (1 in 15). It should be free from lead, iron, bromates, iodides, or nitrates, and contain not more than traces of sulphates or chlorides. On dissolving 0.5 gramme of the dry salt in water, it should require for complete precipitation not more than 51.8 and not less than 51.1 mls of decinormal solution of silver nitrate.

The action of ammonium bromide is the same as that of potassium bromide, with the exception that its absorption is a little more rapid. Ammonium salts taken by the mouth have no stimulant action on the central nervous system. As a general sedative, ammonium bromide is generally given in mixture form. For local application to the throat a linctus may be sipped, a spray solution used, or lozenges and pastilles sucked slowly. Ammonium bromide is incompatible with spirit of nitrous ether.

*Dose.*—3 to 20 decigrams (5 to 30 grains).

### AMMONII BROMIDUM EFFERVESCENS.

EFFERVESCENT AMMONIUM BROMIDE.

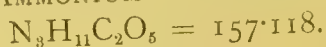
Ammonium Bromide	...	...	...	8.00
Sodium Bicarbonate, in powder	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	24.00
Citric Acid, in powder	...	...	...	16.00
Refined Sugar, in powder	...	...	...	16.00

Mix and granulate the ingredients as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100.

*Dose*.—5 to 30 grammes (75 to 450 grains).

### AMMONII CARBONAS.

AMMONIUM CARBONATE.



Ammonium carbonate, so called, is a mixture of ammonium hydrogen carbonate,  $\text{NH}_4\text{HCO}_3$ , and ammonium carbamate,  $\text{NH}_4\text{NH}_2\text{CO}_2$ , prepared by heating calcium carbonate with an ammonium salt.

It occurs in hard translucent masses with a striated appearance, possessing an ammoniacal odour, soluble in water (1 in 4), slightly soluble in alcohol (1 in 200), soluble in glycerin (1 in 5). On exposure to the air it loses ammonia, and a white efflorescence of ammonium bicarbonate,  $\text{NH}_4\text{HCO}_3$ , is formed; this should be removed before dispensing. It should leave no residue on ignition, should be free from tarry matters, and from more than traces of chlorides and sulphates, and contain 31.65 per cent. of ammonia. The commercial salt is said never to reach the above standard. After being scraped to remove any effloresced salt, ammonium carbonate, 10, will neutralise, approximately, citric acid, 13 $\frac{1}{3}$ , or tartaric acid, 14 $\frac{1}{3}$ .

The action of ammonium carbonate depends on the fact that ammonia gas is given off from its solution in water. It enters largely into "smelling salts," which, by irritating the nasal mucous membrane, act reflexly on the medullary centres. In this way sniffing the gas produces constriction of the peripheral arterioles with a rise in blood pressure, stimulation of respiration, and a quicker and more forcible heart-beat. For this reason it is employed in fainting and collapse and in any condition in which it is desirable to rouse the medullary centres. Taken by the mouth ammonium carbonate mildly stimulates the gastric mucous membrane, and is employed in certain forms of flatulent dyspepsia. It is a valuable expectorant and acts both reflexly on the medulla through irritation of the stomach and directly on the bronchial mucous membrane like any other saline. In large doses it causes vomiting. After absorption ammonium carbonate is changed to urea and causes some diuresis, but unlike the carbonates of sodium and potassium it does not render the blood more alkaline. Taken by the mouth it has no stimulant action on the central nervous system, being excreted as rapidly as it is absorbed, but when it is injected under the skin it has a direct stimulant action on the medulla, and, in large enough doses, causes convulsions. Its employment in cases of sudden heart failure depends on its reflex effects from the respiratory and gastric mucous membranes. It is generally administered, freely diluted, in mixtures. Solutions are used as applications to insect



bites and wasp stings, as well as for injecting in case of snake bites. It is incompatible with acids, acid salts, caustic alkalies, salts of iron, lime water, solutions of alkaloids, preparations of cinchona, and hot water.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

*NOTE.*—Solution of ammonium carbonate is prepared by dissolving 5 of the carbonate in 7·5 of solution of ammonia and sufficient distilled water to produce 100.

## AMMONII CHLORIDUM.

AMMONIUM CHLORIDE.



Ammonium chloride,  $\text{NH}_4\text{Cl}$ , may be prepared by the combination of hydrochloric acid and ammonia.

It occurs as a white crystalline powder, soluble in water (1 in 3), and alcohol (1 in 55). It should leave no residue on ignition, and be free from lead, copper, arsenium, calcium, carbonates, nitrates, and thiocyanates, and contain not more than a trace of iron or sulphates.

Ammonium chloride is quickly absorbed from the stomach and intestines, probably more quickly than any other salt, and exerts all the actions of an ordinary saline—that is to say, it is mildly expectorant, diaphoretic, and diuretic. It increases the secretion of mucus in the bronchi, and is given to assist expectoration in catarrhs. It is a gastric, intestinal, and liver stimulant, particularly useful in hepatic congestion. Large doses (2 grammes) are given in neuralgia and lumbago, three times daily. The action of the ammonium ion, like that of potassium, varies with the mode of administration, thus, when ammonium chloride is injected hypodermically it causes pronounced stimulation of the central nervous system, but when it is administered by the mouth, on account of its very rapid excretion, this is wanting. It is usually given in mixtures flavoured with spirit of chloroform and syrup, or with liquid extract of liquorice. Lozenges containing 12 to 18 centigrams (2 to 3 grains), and pastilles with liquorice are commonly used. Ammonium chloride vapour, formed by the combination of gaseous ammonia and hydrochloric acid, freed from excess of either constituent by passing through water, is inhaled from simple types of apparatus made for the purpose. The vapour is found useful in catarrh of the Eustachian tubes, in naso-pharyngeal catarrh, and as an expectorant in bronchitis. A ready means of producing the vapour is to heat a few grains in an iron spoon. Solutions of ammonium chloride are used as sprays to the throat and as lotions for contused and lacerated wounds. It should not be prescribed with alkalies or their carbonates, mineral acids, or lead and silver salts.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

*NOTES.*—Solution of ammonium chloride is prepared by dissolving 10 of the salt in sufficient distilled water to produce 100. Nessler's solution of ammonium chloride is prepared by dissolving 0·315 of the chloride in sufficient recently boiled ammonia-free distilled water to produce 100.

**AMMONII CITRAS.**

AMMONIUM CITRATE.



Ammonium citrate,  $\text{C}_3\text{H}_4\text{OH}(\text{COONH}_4)_3$ , is prepared by the action of ammonia on citric acid.

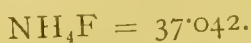
It occurs in the form of a very deliquescent crystalline powder, which tends to lose ammonia, and become partly converted into an acid salt. Very soluble in water, the solution having a neutral or slightly acid reaction. It should be free from the impurities mentioned in the case of Acidum Citricum.

Ammonium citrate is a mild expectorant and diuretic; in very large doses it acts as a laxative. It is absorbed in part, and converted in the tissues to the carbonate, and ultimately to urea; hence, unlike the tartrates and citrates of the fixed alkalies, it does not increase the alkalinity of the urine. It should not, therefore, be employed in patients suffering from the uric acid diathesis. It is generally prescribed in the form of Liquor Ammonii Citratis, and for the same purposes as solution of ammonium acetate. An effervescent alkaline solution of ammonium citrate is prepared by adding 11 decigrams (17 grains) of citric acid to a solution of 10 decigrams (15 grains) of ammonium carbonate.

*Dose.*—2 to 4 grammes (30 to 60 grains).

**AMMONII FLUORIDUM.**

AMMONIUM FLUORIDE.



Ammonium fluoride,  $\text{NH}_4\text{F}$ , is prepared by heating in a platinum vessel an intimate mixture of ammonium chloride and sodium fluoride, or by saturating hydrofluoric acid with solution of ammonia and evaporating.

It occurs in colourless, deliquescent crystals, or in crystalline masses, with a pungent saline taste. Very soluble in water, but only slightly soluble in alcohol. It is fusible and more volatile than ammonium chloride. It attacks glass with formation of ammonia and ammonium fluosilicate, and its aqueous solution loses ammonia on evaporation.

Ammonium fluoride has been recommended for internal use in enlargement of the spleen and in goitre. It should be given in very dilute aqueous solution.

*Dose.*—3 to 8 milligrams ( $\frac{1}{24}$  to  $\frac{1}{8}$  grain).

NOTE. — Ammonium fluoride should be kept in gutta-percha vessels, or in glass bottles lined with paraffin wax.

**AMMONII ICHTHOSULPHONAS.****AMMONIUM ICHTHOSULPHONATE.**

*Synonyms.*—Ichthamol; Ammonium Sulpho-ichthyolate.

Ammonium ichthosulphonate consists of the ammonium salts of the sulphonic acids prepared from ichthyol—the oily product of the destructive distillation of a greyish bituminous schist (“oelstein” or “stinkstein”) found in the Karwendel Mountains, which separate Bavaria from the Tyrol, the bulk of the crude oil, or ichthyol, being produced in the vicinity of the village of Seefeld. The schist is composed largely of the remains of fishes and other marine creatures, and yields from 1 to 10 per cent. of oil, which contains about  $2\frac{1}{2}$  per cent. of sulphur; on treating the oil with sulphuric acid, ichthosulphonic acid is formed, and this, when neutralised with ammonia, yields impure ammonium ichthosulphonate, the substance which is known in commerce under various trivial names.

It occurs as a blackish-brown, viscid liquid with a powerful and characteristic odour. Dried on a water-bath it loses half its weight. It is entirely soluble in water, partly soluble in alcohol and ether, entirely in a mixture of equal parts of alcohol and ether. It mixes with glycerin and oils.

In addition to ammonium ichthosulphonate, the commercial article contains about 1 per cent. of volatile oil with a strong, penetrating odour, from 5 to 7 per cent. of ammonium sulphate, and 50 per cent. of water. Other salts of ichthosulphonic acid can be prepared by substituting calcium, lithium, sodium, zinc, etc., for ammonium; the sodium compound is a moist brownish-black solid.

Ammonium ichthosulphonate is a mild antiseptic, and is employed in cutaneous disorders, both internally and locally. It is partially absorbed when applied to the skin, and has a stimulating and mildly irritant action in chronic skin diseases. Taken internally it is mildly irritant to the gastro-intestinal tract, but it has only a very feebly “poisonous” action. It may be given in capsules containing  $2\frac{1}{2}$  to 6 decigrams (4 to 10 grains), or in pills containing 90 milligrams ( $1\frac{1}{2}$  grains), and massed with liquorice and tragacanth, but sodium ichthosulphonate is more suitable for making pills. Aqueous solutions are used as gargles, lotions (5 to 30 per cent.), injections for gonorrhœa and cystitis (1 to 5 per cent.), and as pigments (20 to 50 per cent.), which dry on the skin. For uterine affections a mixture with glycerin (5 to 10 per cent.) may be employed as a tampon. Ichthamol collodion contains 1 part of ammonium ichthosulphonate with 7 parts of collodion, or 1 part with a mixture of 1 of ether and 2 of collodion. Ointments of various strengths are used, containing from 2 to 50 per cent.; the basis may be anhydrous wool fat, soft paraffin, or a mixture of lard and olive oil; the odour may be disguised to some extent by the addition of eucalyptus, peppermint, citronella, lavender, or other volatile oil. For some forms of rheumatism ichthamol parogen is applied, and covered with wool and oiled silk. Ammonium ichthosul-



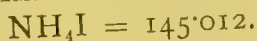
phonate may be used in a dry condition in burns, being mixed with zinc oxide, or bismuth oxide, or a mixture of zinc oxide and magnesium carbonate. Unna's ichthamol paste consists of ammonium ichthosulphonate, 40, starch, 40, water, 20, and strong solution of albumen, 1 or  $1\frac{1}{2}$ ; but instead a Gelatinum Ichthamolis (10 or 20 per cent.) is now generally preferred. Pessaries and suppositories are made with a gelatin base, or with one consisting of theobroma oil and a small proportion of wax; pessaries vary in strength from 2 to 10 per cent., and the suppositories should contain 18 centigrams (3 grains) each. Alkaloids form insoluble salts of ichthosulphonic acid, and are therefore to some extent incompatible.

*Dose.*—1 to 2 grammes (15 to 30 grains).

*NOTES.*—Ammonium ichthosulphonate is also known under the trade-names Ichthyol, Ichtharmon, Ichden, Ichthyodine, Ichthosan, Isarol, Piscarol, Thiolin, etc. Thiol, Tumenol, and Petrosulfol are artificial substitutes for the foregoing, possessing similar properties. Derivatives of ammonium ichthosulphonate are albumin ichthosulphonate (Ichthalbin), formaldehyde ichthosulphonate (Ichthoform), silver ichthosulphonate (Ichthargan), etc.

## AMMONII IODIDUM.

AMMONIUM IODIDE.



Ammonium iodide,  $\text{NH}_4\text{I}$ , may be prepared by the action of ammonium carbonate on solution of ferrous iodide or zinc iodide.

It occurs as a white deliquescent crystalline powder, which gradually becomes brown on exposure to air. It has a sharp saline taste, but no odour of iodine. Very soluble in water (1 in 1), soluble in alcohol (1 in 9). It should not have more than a slight yellow colour. It should be free from other metals, sulphates, thiosulphates, and should contain not more than traces of chloride or bromide.

The action of ammonium iodide is similar to that of sodium and potassium iodides, but it is somewhat more rapidly absorbed from the alimentary canal. It should not be dispensed if highly coloured. A 10 per cent. solution in glycerin is sometimes applied to enlarged tonsils. Ammonium iodide is the active ingredient of the so-called colourless tincture of iodine, prepared with ammonia.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

*NOTE.*—Ammonium iodide should be preserved in well-stoppered bottles, protected from the light.

## AMMONII NITRAS.

AMMONIUM NITRATE.



Ammonium nitrate,  $\text{NH}_4\text{NO}_3$ , may be prepared by neutralising nitric acid with solution of ammonia, and evaporating to crystallisation.

It occurs in colourless, odourless crystals. Very soluble in water (2 in 1), soluble in alcohol (1 in 20). The solutions have an

acid reaction. On careful heating it melts at  $165^{\circ}$ , and at higher temperatures is decomposed chiefly into nitrous oxide and water. It should be free from heavy metals, and contain traces only of chlorides and sulphates.

Ammonium nitrate has a typical salt action (see Sodium Chloride), but, like the nitrates of sodium and potassium, it is more irritant than such salts as sodium and potassium chloride. This salt is used principally as an ingredient of diuretic mixtures, but is rarely used in medicine. It should be administered with care when there is irritation of the stomach or kidneys. Ammonium nitrate is used for the manufacture of nitrous oxide gas, which is prepared by gently and gradually heating the ammonium salt to a temperature of  $176^{\circ}\text{C.}$ , and collecting the gas over water. To purify the gas from nitric oxide it must be passed through a strong solution of ferrous sulphate, and finally through a solution of caustic potash to remove traces of acid.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### AMMONII PERSULPHAS.

AMMONIUM PERSULPHATE.



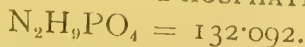
Ammonium persulphate,  $\text{NH}_4\text{SO}_4$ , may be prepared by saturating dilute sulphuric acid with ammonium sulphate and subjecting the mixture to electrolysis. Several days may be necessary for the salt to begin to crystallise out; but having commenced, the separation goes on steadily.

It occurs in white granular crystals. Very soluble in water, and in dissolving causes a considerable fall in temperature; insoluble in absolute alcohol. When a solid persulphate is gently warmed with strong nitric or sulphuric acid, oxygen is evolved largely in the form of ozone. With hydrochloric acid chlorine is obtained in place of oxygen; with silver nitrate black silver peroxide slowly separates; with ferrous sulphate there is rapid oxidation to the ferric state, while organic colouring matters are slowly bleached.

Ammonium persulphate forms the starting point in the preparation of the persulphates. It does not keep so well as the potassium salt. Its purity may be determined by the amount of iodine it liberates from its combination with potassium iodide. This salt is not employed for medicinal purposes, but is largely used in photography for reducing dense negatives; it acts by oxidising and then dissolving part of the silver.

### AMMONII PHOSPHAS.

AMMONIUM PHOSPHATE.



Ammonium phosphate,  $(\text{NH}_4)_2\text{HPO}_4$ , is prepared by the combination of ammonia and phosphoric acid.

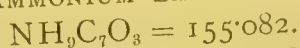
It occurs in colourless prismatic crystals. Soluble in water (1 in 2), insoluble in alcohol. It should be free from lead, copper, and arsenium, and contain not more than traces of iron, chlorides or sulphates. Determined gravimetrically, 99·5 per cent. of pure ammonium phosphate should be indicated.

Ammonium phosphate has a typical saline action, and is used mainly for its diuretic effect. It is not so easily absorbed as most of the ammonium salts; during excretion it renders the urine slightly more acid. It is recommended in cases of uric acid diathesis, on the supposition that it assists in the solution of urates. At best it is a very mild remedy. It is occasionally prescribed in mixtures, but large quantities of tinctures are liable to throw it out of solution. It is incompatible with fixed alkalies.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### AMMONII SALICYLAS.

AMMONIUM SALICYLATE.



Ammonium salicylate,  $\text{C}_6\text{H}_4(\text{OH})\text{COONH}_4$ , may be obtained by the interaction of ammonia and salicylic acid.

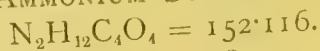
The salicylate occurs in colourless crystals, or as a white crystalline powder, and has a sweetish taste. Very soluble in water.

The action of this salt is the same as that of sodium salicylate, except that the ammonium salt is more quickly absorbed into the system. It is a fallacy to suppose that ammonium salicylate is less depressant to the central nervous system than sodium salicylate. It may be given in mixtures, powders, or cachets, but in consequence of its liability to cause gastric disturbance it should not be given too frequently nor in too large a dose. The salicylate is incompatible with mineral acids and fixed alkalies.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

### AMMONII SUCCINAS.

AMMONIUM SUCCINATE.



Ammonium succinate,  $(\text{NH}_4)_2\text{C}_4\text{H}_4\text{O}_4$ , may be obtained by the interaction of ammonia and succinic acid.

It occurs in colourless crystals, very soluble in water and alcohol. If an excess of barium chloride be added to a solution, the solution boiled and the precipitate filtered off, the filtrate should give no precipitate with ferric chloride (absence of benzoic acid).

Ammonium succinate is not absorbed from the alimentary canal very quickly, and in large doses it may therefore have a saline cathartic action. The part which is absorbed undergoes complete

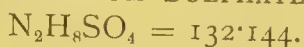


oxidation in the body. Its action after absorption is that of the other salines—mildly diuretic, expectorant and diaphoretic. It is administered in the form of a mixture for spasmodic labour pains.

*Dose.*—1 to 2 decigrams (2 to 3 grains).

### AMMONII SULPHAS.

AMMONIUM SULPHATE.



Ammonium sulphate,  $(\text{NH}_4)_2\text{SO}_4$ , as found in commerce, is obtained chiefly by neutralisation of the ammoniacal liquor of the gasworks with sulphuric acid, the product being more or less purified by crystallisation.

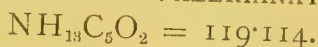
It occurs in colourless rhombic crystals. Very soluble in water (about 3 in 4), insoluble in alcohol; ammonium sulphate melts at about  $140^\circ$  and decomposes at about  $260^\circ$ .

The sulphate differs from other ammonium salts in that it is absorbed with difficulty from the intestines, and hence acts as a mild saline aperient. It may be used in the form of a 5 to 10 per cent. solution. Three distinct grades of ammonium sulphate are met with in commerce:—(1) "Crude," which is largely used in the manufacture of artificial manures; (2) "Recrystallised," which is used for most of the ordinary chemical purposes; (3) "Puriss," which is used as a reagent for delicate chemical analysis.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### AMMONII VALERIANAS.

AMMONIUM VALERIANATE.



*Synonym.*—Ammonium Iso-valerianate.

Ammonium valerianate,  $\text{C}_4\text{H}_9\text{COONH}_4$ , is prepared by the action of ammonia on valerianic acid.

It occurs in colourless very deliquescent crystals, with the odour of valerianic acid. Very soluble in water and alcohol. It usually has a slightly acid reaction, owing to loss of ammonia. It should be free from heavy metals and from acetates.

Ammonium valerianate was originally introduced as a remedy for neuralgia, nervous headache, and hysteria. It has, however, no action different from that possessed by other salts of the acetic acid series, except that induced by its extremely objectionable smell and taste. It is given in aqueous solution as a mixture, sometimes with tincture or extract of valerian and in pills. If the drug has an acid reaction it should be carefully neutralised with ammonia. The disagreeable odour of valerianates is masked to a considerable extent by the use of orange-flower water. It is incompatible with acids and alkalis.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

*NOTE.*—Ammonium valerianate should be kept in well-stoppered bottles.

**AMYGDALÆ AMARÆ.****BITTER ALMONDS.**

Bitter almonds are the dried seeds of *Prunus Amygdalus*, Stokes, var. *amara*, Baillon (N.O. Rosaceæ). Almond trees, both sweet and bitter, are widely cultivated in the countries that border on the Mediterranean. The fruit is a drupe, which splits open as it ripens, disclosing the hard endocarp, within which the almond is to be found. Bitter almonds are exported chiefly from Morocco and Sicily.

The seeds are shorter and broader than the ordinary Jordan sweet almond, being about 2 centimetres long and 1·25 centimetres broad, and are at once distinguishable by the characteristic odour evolved when they are triturated with water, as well as by their bitter taste.

The chief constituents of bitter almonds are fixed oil (about 50 per cent.), a bitter crystalline glucoside amygdalin (about 3 to 4 per cent.), at least two enzyme ferments, emulsin and laccase, together with other proteid matter, etc. The fixed oil is obtained by crushing and pressing the seeds, and constitutes the bulk of the genuine almond oil of commerce. The cake thus produced is ground, mixed with warm water, and allowed to stand for twelve hours, during which time the ferment emulsin splits up the glucoside amygdalin into dextrose, hydrocyanic acid, and benzaldehyde. Steam is then passed through the mixture, when the hydrocyanic acid and benzaldehyde distil over, partly in the free state and partly in unstable combination as benzaldehyde - cyanhydrin. These form a heavy oil (essential oil of almonds), which sinks in water, and from which the hydrocyanic acid may be removed in the form of calcium ferrocyanide by shaking it with milk of lime and solution of ferrous sulphate, and again distilling. Bitter almonds yield about 0·5 to 0·7 or even 0·9 per cent. of essential oil, including about 0·25 per cent. of hydrocyanic acid.

The action of bitter almonds depends upon the hydrocyanic acid formed. Unpleasant symptoms, especially in children, may arise from eating large quantities. For use in cough mixtures, Pulvis Amygdalæ Amaræ Compositus is prepared, bitter almonds being used instead of the sweet variety in the pharmacopœial formula, and from the compound powder the corresponding Mistura Amygdalæ Amaræ is prepared. For toilet purposes, and as a basis of lotions, Mistura Amygdalæ Amaræ is preferred without acacia and sugar, the proportion of bitter almonds being then increased (see Mistura Amygdalæ Amaræ).

**AMYGDALÆ DULCES.****SWEET ALMONDS.**

Sweet almonds are the dried seeds of *Prunus Amygdalus*, Stokes var. *dulcis*, Baillon (N.O. Rosaceæ). The sweet almond tree closely

resembles the bitter almond tree and is cultivated in the same districts, but especially in Southern Italy, Southern France, and Spain.

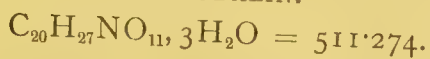
The variety known as the Jordan almond, which is exported from Malaga, is alone official, and may be recognised by its large size and long narrow shape, being about 2.25 to 2.5 centimetres long and 1.5 broad. Valencia almonds, which are also exported from Spain, are shorter and broader.

When fresh, sweet almonds contain an average of 27.7 per cent. of water, 16.5 per cent. of proteids (including emulsin), 41.0 per cent. of fixed oil, and 2.8 per cent. of cellulose. They contain no starch, and leave, when incinerated, about 1.5 to 2 per cent. of ash. The most important constituent is the fixed oil, which varies in quantity from about 35 to 56 per cent. The oil cake which is left after the expression of the oil contains about 10 per cent. of water, 15 per cent. of oil, 41 per cent. of proteids, 20 per cent. of non-proteids, 9 per cent. of fibre, and 4.3 per cent. of mineral constituents. Sweet almonds differ essentially from bitter almonds in containing no amygdalin; the taste of the seeds and of the emulsion obtained by triturating them with water is bland and agreeable.

Sweet almonds are demulcent, and a mixture made from the compound powder of almonds is a useful vehicle for cough medicines. Almond flour when deprived of its oil forms a valuable material for preparing bread for diabetic patients. Almond meal is used as a "water-softener" for toilet purposes.

## AMYGDALINUM.

### AMYGDALIN.



Amygdalin,  $\text{C}_{20}\text{H}_{27}\text{NO}_{11}, 3\text{H}_2\text{O}$ , is a glucoside, obtained from bitter almonds, or the seeds of other Rosaceous plants.

It occurs in white crystals with a bitter taste. It is neutral in reaction and lævorotatory ( $[\alpha]_D = -35.5^\circ$ ). Soluble in water and alcohol, insoluble in ether. It melts at about  $200^\circ$ , after darkening in colour, and sets to a glassy mass, which melts at  $125^\circ$  to  $130^\circ$ . By the action of emulsin it is decomposed into dextrose, benzaldehyde, and hydrocyanic acid. This decomposition also occurs under the influence of dilute acids.

Amygdalin in itself has no action, but in the stomach it undergoes decomposition, hydrocyanic acid and benzaldehyde being formed, so that its ultimate effect is that of hydrocyanic acid. A solution is sometimes employed externally to allay irritation of skin affections. It is also used in cough mixtures as an expectorant.

*Dose.*—1 to 3 centigrams ( $\frac{1}{4}$  to  $\frac{1}{2}$  grain).



**AMYL ACETAS.**

AMYL ACETATE.

*Synonym.*—Oil of Pear.

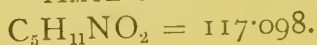
Amyl acetate,  $\text{C}_5\text{H}_{11}\text{C}_2\text{H}_3\text{O}_2$ , may be prepared by the action of glacial acetic acid on amylic alcohol, in the presence of a small quantity of sulphuric acid. The ethereal layer is separated, well washed with water, again separated, and rectified by distillation.

It occurs as a colourless, mobile liquid, having an exceedingly fragrant pear-like odour, neutral, and inflammable. Very slightly soluble in water; soluble in all proportions of alcohol, ether, acetic ether, and amyl alcohol. A compound alcoholic solution is known in commerce as essence of jargonelle pear. Specific gravity, about  $0.876$ ; boiling-point,  $135^\circ$  to  $145^\circ$ . After long keeping the liquid becomes acid in reaction; this, however, does not injure its employment as a fruit essence, but if necessary it may be treated with sodium bicarbonate and re-distilled.

Amyl acetate is a good solvent of resins and pyroxylin, and is therefore much used in the preparation of lacquers, varnishes, and collodions.

**AMYL NITRIS.**

AMYL NITRITE.



Amyl nitrite, so-called, is a mixture of iso-amyl nitrite,  $\text{C}_5\text{H}_{11}\text{NO}_2$ , with other nitrites of the homologous series; it may be prepared by acting on amyl alcohol with sodium nitrite and sulphuric acid.

It occurs as a yellowish fragrant liquid with only the faintest acid reaction. Almost insoluble in water, but miscible with alcohol. Specific gravity,  $0.870$  to  $0.880$ . Boiling-point,  $96^\circ$  to  $99^\circ$ . It is officially stated that 70 per cent. should distil between  $90^\circ$  and  $100^\circ$ . Diluted with alcohol (1 to 20) and tested in a nitrometer, it should yield not less than six times its volume of nitric oxide. It should not contain more than a trace of aldehyde, and should be free from water.

Amyl nitrite is employed as an inhalation; it is rapidly absorbed by the great area of lung capillaries, so that the onset of its action is almost immediate, but the effect only lasts for two or three minutes. It depresses all plain muscle throughout the body, its effects being most pronounced on the circulatory system. The arterioles dilate everywhere and the blood pressure falls very considerably; other plain muscle, such as that in the bronchioles, intestines, and ureters undergoes a like relaxation. Amyl nitrite is used in cases of emergency; in angina pectoris to dilate the coronary vessels; in spasmodic asthma to dilate the bronchioles; in renal colic to relax the ureters, etc. If inhaled during the aura of an epileptic seizure it will in certain cases abort the attack. Its employment in

neuralgias and chloroform syncope is of more doubtful value. It is usually administered by inhalation, but in cases where inhalation cannot be performed it may be used as a hypodermic injection. For inhalation it is supplied in small glass capsules containing from 1 to 3 decimils (2 to 5 minims), covered with cotton wool and silk, which should be placed in a handkerchief, and cautiously broken by pressure. It may be given internally in the form of *Mistura Amyl Nitritis*. In measuring amyl nitrite, inhalation of the vapour should be avoided.

*Dose*.—3 to 6 centimils ( $\frac{1}{2}$  to 1 minim); by inhalation, the vapour of 1 to 3 decimils (2 to 5 minims).

*NOTE*.—Amyl nitrite should be kept in well-stoppered bottles, in a cool, dark place, to retard decomposition as much as possible.

### AMYLENUM HYDRATUM.

AMYLENE HYDRATE.



*Synonyms*.—Tertiary Amylic Alcohol; Dimethyl-ethyl Carbinol.

Amylene hydrate,  $(\text{CH}_3)_2\text{C}_2\text{H}_5\cdot\text{COH}$ , is prepared by treating trimethylethylene (amylene) with sulphuric acid, and subsequently distilling the amylene sulphate with alkali.

It occurs as a clear volatile liquid with a penetrating odour resembling camphor and peppermint, and a pungent taste. Soluble in water (1 in 8) and in all proportions of alcohol. Specific gravity, 0.815 to 0.820. Boiling-point,  $99^\circ$  to  $103^\circ$ . On cooling to a low temperature it solidifies in acicular crystals, which are hygroscopic. Amylene hydrate is specially liable to contain amylic alcohol, which may be detected by treating 20 mils of an aqueous solution (1 to 20) with 2 drops of potassium permanganate solution, when there should be no decoloration within ten minutes. It should not reduce an ammoniated solution of silver nitrate within ten minutes when heated on a water-bath (absence of aldehyde). On shaking 8 mils with 6 decigrams of exsiccated cupric sulphate no pronounced blue colour should be produced (absence of water). Oxidation with chromic acid decomposes it into acetic acid and acetone.

Amylene hydrate was introduced by Von Mering as a hypnotic, and he stated that it quickly produced sleep without ill effects. This favourable impression has not been upheld; it induces stimulation of the central nervous system much more frequently than other hypnotics, and is apt to produce a subnormal temperature. It is two or three times as powerful a hypnotic as paraldehyde, and is comparatively safe. In the animal body it undergoes complete oxidation.

*Dose*.—2 to 4 mils (30 to 60 minims).

## AMYLUM.

## STARCH.

*Synonyms.*—Wheat, Maize, Rice, Potato, and Maranta Starches.

Starch is obtained from wheat, *Triticum sativum*, Lam., rice, *Oryza sativa*, Linn., and maize, *Zea Mays*, Linn. (N.O. Gramineæ); but, in addition to these official varieties, potato and maranta starches are also used. The starch is obtained from the grain, etc., by grinding, freeing from gluten, washing, and allowing the suspended starch to settle.

It occurs as a fine, white, inodorous powder, or in irregular and columnar masses which are readily powdered. It is insoluble in cold water, to which it should not impart either an acid or alkaline reaction; but wheat starch is frequently slightly acid, maize and rice starch slightly alkaline to litmus. On boiling with water it forms a gelatinous mixture which, when cooled, gives a deep blue colour with solution of iodine. When incinerated it should leave only a trace (0.05 per cent.) of ash.

Starch is a carbohydrate with a very complex molecule, its formula being a multiple of  $C_6H_{10}O_5$ . Its identity and freedom from admixture with other starches may be determined by means of the microscope. Wheat starch consists principally of large grains, about 30 to 40 $\mu$  in diameter, mixed with small grains 2 to 8 $\mu$  in diameter. The former are lenticular in shape, and seldom exhibit well-marked striations or a definite hilum. Maize starch grains are more uniform in size, measuring 10 to 25 $\mu$  in diameter. The majority are polygonal in shape, but some are more or less rounded; the hilum is usually fissured or stellate, central, and conspicuous; concentric striations are not visible. Rice starch grains range mostly from 4 to 6 $\mu$  in diameter; they are angular and seldom exhibit a definite hilum. Potato starch grains from the tubers of *Solanum tuberosum* have an oval, ovate, or conchoidal outline; the hilum is a point and generally situated near the narrow end of the grain; the striations are numerous and distinct. Large grains measure 75 to 110 $\mu$  in length, those of medium size, 45 to 65 $\mu$ . Maranta starch (arrowroot) from *Maranta arundinacea* resembles potato starch, but the grains are usually smaller (30 to 60 $\mu$ , rarely 70 $\mu$ ); the hilum is often linear or stellate, and situated at the broad end of the grain.

Starch is used in medicine as a dusting powder to cover abrasions or to protect irritated parts of the skin. It soaks up secretions and helps to render the injured spot less liable to bacterial infection. Starch boiled with water may be employed as a demulcent. As a dusting powder it is used either alone or mixed with zinc oxide, boric acid and other similar substances. It also forms the basis of violet powder. As a protective application in skin diseases and for chilblains it may be used in the form of the official Glycerinum Amyli. Mucilage of starch (1 in 50) is the basis for many enemas, and the best antidote for poisoning by iodine; it should be prepared freshly as required by triturating 2 of starch with sufficient distilled water to form a smooth paste, then adding sufficient water to produce



roo, boiling for a few minutes with constant stirring, and cooling. Potato starch is best for determining the diastasic value of malt extract. Violet powder is usually prepared from wheat or rice starch, perfumed.

### AMYLUM IODATUM.

#### IODISED STARCH.

Iodine	...	...	...	...	...	...	5'00
Starch	...	...	...	...	...	...	95'00

Distilled Water, a sufficient quantity,

Triturate the iodine with a little distilled water, add the starch gradually, and continue the trituration until the compound assumes a uniform dark blue or nearly black colour. Dry at a temperature not exceeding 40°, and reduce the product to a fine powder.

Iodised starch contains iodine in very weak combination. It is administered internally in syphilis and other cachexias, and may be given in milk, water, gruel, or arrowroot. Externally it is used as a dry dressing, being a good substitute for iodoform.

*Dose.*—2 to 5 grammes (30 to 75 grains).

### ANCHUSÆ RADIX.

#### ALKANNA ROOT.

*Synonym.*—Alkanet Root.

Alkanna root is obtained from *Alkanna tinctoria*, Tausch. (N.O. Boraginæ), an herbaceous plant, growing in Hungary, the Grecian Archipelago, and Asiatic Turkey.

The simple tapering roots are of a deep reddish-purple colour, and crowned by the remains of leaves, which bear whitish, bristly hairs. They have little odour or taste, and readily colour the fingers when handled. The roots vary commonly from 10 to 15 centimetres in length and 1 to 2 centimetres in thickness. The external surface is deeply furrowed and the outer layers readily exfoliate in papery strips. The furrows are often so deep as to separate the whitish wood into isolated strands, these changes being due to the destruction of the parenchymatous tissue by conversion into colouring matter.

The root contains two red substances of acid nature, named anchusic and alkannic acids; alkalies change the colour of the former to green and of the latter to blue. The root yields from 5 to 6 per cent. of a red, amorphous, resinous substance, to which the name of alkannin has been given. This colouring matter is readily soluble in oils, and is employed as a reagent for the detection of oil in vegetable microscopical research, the solution being prepared by dissolving the alkannin in absolute alcohol, adding an equal volume of water, and filtering the solution.

Alkanna root is used for colouring lip salves and similar toilet preparations.

*NOTE.*—The roots of *Onosma echioides*, Linn., and of *Macrotamia cephalotes*, DC., contain a colouring matter similar to that found in alkanna root, but both roots are much larger than alkanna.

**ANDROGRAPHIS.****ANDROGRAPHIS.**

Andrographis is the dried plant of *Andrographis paniculata*, Nees (N.O. Acanthaceæ), which is indigenous to India, Ceylon, and Java.

The plant is an annual, and grows from 3 decimetres to 1 metre in height. The stem is 3 to 6 millimetres thick, smooth, and dark green, quadrangular in shape, with longitudinal furrows, and knotted at the points from which the branches spring. The leaves are opposite and decussate, lanceolate in shape, and have an entire margin and short petiole. They are dark green and shiny on the upper surface, the lower surface being paler and finely granular. They are thin and brittle, and vary in size, the larger ones being as long as 7.5 centimetres, and 2.5 centimetres wide. Examined under the microscope they exhibit conspicuous cystoliths under the upper as well as the lower epidermis. The calyx is small, hairy, and deeply five-cleft. The fruits are erect two-valved capsules, about 15 millimetres long and 3 millimetres wide. The root is woody, simple and fusiform. The drug has no odour, but a very bitter taste.

The chief constituent of the drug is an indifferent, non-basic, bitter principle, which gives a precipitate with tannic acid, but has not yet been thoroughly investigated.

The preparations of this drug are used for their bitter properties, a description of the action of which will be found under *Gentianæ Radix*. An infusion, tincture, and concentrated liquor are used.

NOTE.—Andrographis is sanctioned for use in India and the Eastern Colonies, where it is used as an equivalent of chiretta.

**ANETHI FRUCTUS.****DILL FRUIT.**

Dill fruit is the dried ripe fruit of *Peucedanum graveolens*, Benth. and Hook. f., (N.O. Umbelliferæ), an annual herb cultivated in Germany, and also to a smaller extent in England.

Each of the brown mericarps, which are usually separate in the commercial drug, is about 4 millimetres long and 2 to 3 millimetres broad. They are so strongly compressed as to be almost flat, and the lateral ridges are prolonged to form membranous wings, the dorsal ridges being brown in colour and consequently inconspicuous. They have a pleasant aromatic odour and taste, and contain about 3 or 4 per cent. of volatile oil. The fruits should yield about 7 per cent. of ash on incineration.

The action of dill fruit depends upon the essential oil which it contains (see *Oleum Anethi*). It is used in mixtures in the form of *Aqua Anethi*, or in pills in the form of its volatile oil. Dill water is a common domestic remedy for the flatulence of infancy, and is a useful vehicle for children's medicine generally.

NOTES.—The official dill fruit should be carefully distinguished from Indian dill fruit (*P. Sowa*, Kurz.), considerable quantities of which are imported from Bombay. These are easily distinguished from the genuine by being narrower and more strongly convex, as well as by the pale colour of the dorsal ridges, which renders these much more conspicuous than those of the official fruit. The mericarps are moreover usually united and attached to a small pedicel. The volatile oil differs from that of *P. graveolens* by its higher specific gravity (0.948 to 0.970), lower optical rotation (+41 to +47), and by containing dill apiol, which boils at 285° and sinks in water.

## ANETHOL.

ANETHOL.



Anethol, or para-methoxy-allyl benzene,  $\text{C}_{10}\text{H}_{12}\text{O}$ , is obtained from oil of anise.

It occurs as a white, crystalline mass with the odour of oil of anise. Slightly soluble in water, readily soluble in alcohol and ether. Melting-point, 21.5° to 22°; when melted it is a strongly refractive colourless liquid. Specific gravity, 0.984 to 0.986, at 25°. Boiling-point, 233° to 234°. When evaporated on a water-bath it leaves nearly 10 per cent. of a non-volatile odourless polymer.

Anethol has the action of essential oils generally, and may be used as a carminative and expectorant.

*Dose*.—3 to 18 centimils ( $\frac{1}{2}$  to 3 minims).

## ANGELICÆ FRUCTUS.

ANGELICA FRUIT.

Angelica fruit is the product of *Archangelica officinalis*, Hoffm. (N.O. Umbelliferae), a biennial plant indigenous to Northern Europe and Asia, but cultivated for medicinal use in Thuringia and elsewhere.

The dried fruits are yellowish, oval, about 7 millimetres long, 5 millimetres wide, and strongly compressed dorsally. The three dorsal ridges are prominent and bluntly keeled, and the two lateral extended to form membranous margins. The mericarps are usually separate—a brown seed lying loose in the cavity of each. The transverse section of the pericarp is divisible into an outer portion which is free from vittæ, and an inner portion containing about twenty vittæ in each mericarp. The drug has an aromatic odour, and aromatic, slightly bitter taste.

Angelica fruit yields about 1 per cent. of volatile oil (specific gravity, 0.856 to 0.900;  $[a]_D = +11$  to  $+12$ ), the only known constituents of which are phellandrene and esters of methyl-ethyl-acetic (valeric) and oxymyristic acids.

The properties of angelica fruit resemble those of angelica root.



**ANGELICÆ RADIX.****ANGELICA ROOT.**

Angelica root is obtained from *Archangelica officinalis*, Hoffm. (N.O. Umbelliferæ), a biennial plant indigenous to Northern Europe and Asia, but cultivated for medicinal use in Thuringia and elsewhere.

The drug consists of a short rhizome about 6 centimetres thick, to which the remains of leaves are attached, and from which numerous greyish-brown roots from 20 to 30 centimetres long and from 0.5 to 1.0 centimetre thick proceed, the latter being often plaited or twisted together. The root breaks with a short fracture and exhibits in transverse section a broad cortex, in which numerous radially arranged yellowish-brown oleo-resin ducts are to be seen. The wood is radiate, the wood rays being finely porous and narrower than the white medullary rays. The drug possesses a strong aromatic odour and taste.

The chief constituents of angelica root are volatile oil (0.3 to 1.0 per cent.), resin (6.0 per cent.), angelic acid and a phytosterin, angelicin. The volatile oil has a specific gravity, 0.857 to 0.918; it contains phellandrene and other terpenes, together with a sesquiterpene and esters of methyl-ethyl-acetic (valeric) and oxypentadecylic acids; the chief odorous constituent is in the portion of higher boiling-point.

Angelica root is generally used as a stimulating expectorant, being administered either in the form of powder, or as an infusion (1 in 20).

*Dose.*—6 to 20 decigrams (10 to 30 grains).

*NOTE.*—The root of wild angelica, *Angelica sylvestris*, Linn., a common British plant, is less branched and much less aromatic than that of *Archangelica officinalis*.

**ANILINUM.****ANILINE.**

*Synonym.*—Aniline Oil.

Aniline, or amido-benzene,  $\text{C}_6\text{H}_5\text{NH}_2$ , is prepared by the reduction of nitro-benzene.

It occurs as a colourless or slightly brown, oily liquid, with a characteristic odour, and an aromatic burning taste. Soluble in water (1 in 27), and miscible in all proportions with alcohol, ether, and oils. Aniline distils completely below  $184^\circ$ . It solidifies in a freezing mixture, the crystals melting again at  $-8^\circ$ ; specific gravity, 1.027. With acids it forms crystalline salts. The addition of a drop of aniline to solution of chlorinated soda causes the formation of an intense violet colour, and the addition of a few drops of potassium bichromate solution to a mixture of aniline and sulphuric acid produces an intense blue colour.

Aniline is a general protoplasmic poison; taken internally in large

doses, it causes spasmodic movements of the muscles and changes oxyhæmoglobin into methæmoglobin. It is rarely employed in medicine. As an inhalation, it has been used in phthisis, mixed with seven times its volume of eucalyptus, peppermint, anise, or gaultheria oil. It may also be given by the mouth, mixed with glycerin and well diluted with water in epilepsy. A saturated solution in water is used for the preparation of staining solutions for microscopical work.

*Dose*.—1 to 5 decimils (2 to 8 minims).

*NOTES*.—Aniline tends to become coloured on keeping, and should be stored in small well-stoppered bottles, protected from the light. Aniline blue is a dye which is sometimes used to colour surgical dressings.

## ANISI FRUCTUS.

### ANISE FRUIT.

*Synonyms*.—Anisum; Aniseed.

Anise fruit or aniseed is the dried ripe fruit of *Pimpinella Anisum*, Linn. (N.O. Umbelliferae), an annual plant, cultivated in many countries, but particularly in Spain, Southern Russia, and Bulgaria. The Spanish fruit is the finest and best adapted for pharmaceutical use, whilst Russian is used chiefly for the production of volatile oil.

The fruit is characterised by its ovoid shape, greyish-green or brownish colour and very short, stout hairs. The fruit is usually entire, and supported by a slender pedicel, while the ridges are uniform in thickness. A transverse section cut from the centre of each mericarp differs from that of most other umbelliferous fruits in exhibiting numerous (thirty to forty) oil glands. The fruit has an agreeable aromatic odour and taste, due to the presence of volatile oil. The drug should not yield more than 6 per cent. of ash on incineration.

The chief constituent of anise fruit is the volatile oil, of which it yields from 2.5 to 3.5 per cent.; other constituents are fixed oil, choline, sugar, and mucilage.

The action of anise fruit depends upon the essential oil which it contains (see *Oleum Anisi*). The drug has stimulating carminative properties, and its preparations are used as ingredients of cough mixtures because of its service as a mild expectorant. The oil is used as an ingredient of cathartic and aperient pills to counteract the tendency to griping. Anise oil is a good antiseptic, and is used, mixed with oil of peppermint or gaultheria, to flavour aromatic liquid dentifrices.

*NOTES*.—Anise fruit, especially that imported from Italy, is liable to admixture with hemlock fruit. The latter is readily identified by the absence of hairs, by the crenately thickened ridges, and by the deep groove which the seed (not the fruit) exhibits on its commissural side. It also evolves a mouse-like odour when crushed and moistened with solution of potash, but this test is insufficient to detect a small admixture of hemlock fruit in anise.

**ANISI STELLATI FRUCTUS.****STAR ANISE FRUIT.**

Star anise fruit is the dried ripe fruit of *Illicium verum*, Hook. f. (N.O. Magnoliaceæ), a tree indigenous to the Southern and South-Western provinces of China.

The fruit consists of eight stellately arranged carpels attached to a stout curved peduncle. The carpels are about 12 millimetres in length, boat-shaped, and bluntly beaked at the apex, but flat at the base. They are dark brown in colour, and wrinkled; the ventral suture is often open, exposing the smooth, shining, hard, reddish-brown seed, with brittle seed-coats, and a large, soft, oily kernel. The odour and taste are spicy and aromatic.

The chief constituent of the fruit is a volatile oil, of which it contains about 5 per cent. This oil is situated in the pericarp of the fruit and kernel of the seed, and is almost identical with that obtained from anise fruit, and may be used instead of the latter.

The powdered drug is administered in India as a substitute for the official anise fruit in doses of 3 to 20 decigrams (5 to 30 grains); it is sometimes used in the form of infusion (1 in 20).

NOTES.—Japanese star anise, from *Illicium religiosum*, Siebold, is smaller and less regular in appearance. The carpels are more wrinkled, the beak more acute, and the peduncle straighter than is the case with the fruit of *I. verum*. They differ also in the odour, which is balsamic, and in the taste, which is disagreeably bitter instead of sweet and spicy. As Japanese star anise fruit is poisonous, care should be taken not to confuse it with the Chinese fruit.

**ANTHEMIDIS FLORES.****CHAMOMILE FLOWERS.**

*Synonyms.*—Anthemis; Chamomiles.

Chamomile flowers consist of the dried flower-heads of *Anthemis nobilis*, Linn. (N.O. Compositæ), a small annual plant indigenous to Britain and cultivated there as well as in Belgium and France. Those collected from cultivated plants are alone official.

The dried flower-heads form hemispherical masses about 12 to 20 millimetres in diameter. Under cultivation the yellow disc florets of the wild plant change more or less completely into white ligulate florets, and the flower-heads are then known as double or semi-double, according to the extent to which this change has taken place. Chamomile flowers are particularly characterised by the solid, conical receptacle, and by the abundant, blunt, narrow, scaly paleæ. German chamomiles (*Matricaria Chamomilla*, Linn.) have a hollow conical receptacle and no paleæ, whilst feverfew flowers (*Chrysanthemum Parthenium*, Bernh.) have flat receptacles, and any paleæ that may be present are acute. True chamomiles have a strong aromatic odour and bitter taste. They yield about 5 per cent. of ash on incineration.

Chamomile flowers contain a volatile oil which is blue when freshly distilled, a crystalline bitter principle (anthemic acid), a phytosterin (anthesterin), and a little resin. Anthemic acid is



glucosidal and easily hydrolysed, the bitter taste at the same time disappearing. Preparations of chamomile flowers should therefore be subjected as little as possible to the action of heat.

The flowers are sometimes employed externally in the form of a poultice. Used as a warm fomentation, chamomile is a popular remedy in the early stages of inflammation. It is used internally to improve the appetite and aid digestion, and for this purpose is largely given in atonic dyspepsia, the extract and infusion (1 in 20) being used. The bitter principle of chamomile has well-marked stomachic tonic properties, and its volatile oil is stimulant and antispasmodic. A warm infusion of the drug acts as an emetic. An infusion of chamomile and bruised poppy capsules is a popular fomentation for bruises, dental abscesses, and deep-seated inflammations. The oil may be combined in pills with purgatives to diminish the tendency to griping.

NOTES.—In its wild state the chamomile plant produces flower-heads consisting of two or three rows of bracts surrounding a single row of ray florets with white ligulate corollas, the centre being occupied by numerous yellow tubular florets closely packed on a solid conical receptacle, which bears in addition numerous chaffy paleæ. Such wild flowers are often collected by Scotch cottars for their own use, any excess being sold to druggists and known as Scotch chamomiles, but they are scarcely a commercial article.

## ANTHRAQUINONUM.

ANTHRAQUINONE.



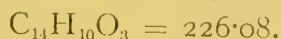
Anthraquinone,  $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_4$ , is obtained by the oxidation of anthracene.

It occurs in yellow needles. Melting-point,  $273^\circ$ ; boiling-point,  $379^\circ$  to  $381^\circ$ . It sublimes at  $250^\circ$ . Insoluble in water, slightly soluble in alcohol and ether, readily soluble in acetic acid. If a little be mixed with some zinc dust and solution of sodium hydroxide, and the mixture heated to boiling, a red colour is obtained which disappears on shaking.

Anthraquinone is not used medicinally, but synthetic oxyanthraquinone derivatives, such as anthrapurpurin diacetate (Purgatin or Purgatol) and rufigallic acid hexamethyl-ester (Exodin), possess laxative properties, and are used as mild aperients, in doses of  $\frac{1}{2}$  to 1 gramme ( $7\frac{1}{2}$  to 15 grains).

## ANTHRAROBINUM.

ANTHRAROBIN.



Anthrarobin,  $\text{C}_6\text{H}_4\text{C}(\text{OH})\text{CHC}_6\text{H}_2(\text{OH})_2$ , is obtained by the reduction of alizarin.

It occurs as a granular yellowish-brown powder, slightly soluble in water, readily soluble in alcohol, ether, acetone, glacial acetic acid, and alkalis. Melting-point,  $208^\circ$ .

Anthrarobin was introduced by Liebermann as a substitute for chrysarobin in psoriasis, because it does not irritate or stain the skin. It may be employed in lotions (5 to 10 per cent. in alcohol), or as an ointment (1 in 10 or 1 in 8) made with olive oil and lard. Of late years its value has been disputed, and it is now rarely used.

### ANTIDOTUM ARSENICI.

#### ARSENIC ANTIDOTE.

*Synonym.*—Ferri Hydroxidum cum Magnesii Oxido.

Solution of Ferric Sulphate      ...      ...      ...      4·00

Magnesia      ...      ...      ...      ...      ...      1·00

Distilled Water, a sufficient quantity.

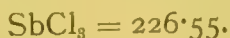
Mix the solution of ferric sulphate with 12·5 of the water, and keep the liquid in a well-stoppered bottle capable of containing 100 parts by volume. Rub the magnesia with cold water to a smooth and thin mixture, dilute this with sufficient water to make the product measure 75, and transfer the liquid to a well-stoppered bottle. When the preparation is required for use, shake the magnesia mixture to a homogeneous thin magma, add it gradually to the diluted solution of ferric sulphate, and shake them together until a uniform smooth mixture results.

*Dose.*—120 mils (4 fluid ounces).

*NOTE.*—The value of this mixture as an antidote in cases of arsenical poisoning has been called in question.

### ANTIMONII CHLORIDUM.

#### ANTIMONIOUS CHLORIDE.



Antimonious chloride,  $\text{SbCl}_3$ , is obtained by the action of chlorine on antimony.

It occurs in colourless, translucent, crystalline masses, which are very deliquescent. Soluble in alcohol, and in a small amount of water, but on the addition of more water insoluble oxychlorides are formed. Melting-point,  $73^\circ$ ; boiling-point,  $223^\circ$ . It should yield no reaction with the tests for lead, copper, arsenium, iron, potassium, sodium, or sulphates.

Antimonious chloride is very rarely used in medicine. It was formerly employed in the solid state, or as *Liquor Antimonii Chloridi*, as an escharotic for poisoned wounds and cancerous growths.

### ANTIMONII OXIDUM.

#### ANTIMONIOUS OXIDE.



Antimonious oxide,  $\text{Sb}_2\text{O}_3$ , is prepared by boiling precipitated antimony oxychloride with sodium carbonate.

It occurs as a greyish-white powder, insoluble in water, soluble in hydrochloric acid. It melts at a low red heat. It should be free

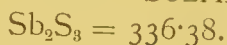
from lead, copper, arsenium, calcium, sodium, and potassium, and contain not more than a trace of iron or slight traces of chlorides or sulphates. Freshly prepared and titrated, after conversion into tartarated antimony, with standard solution of iodine, 100 per cent. of antimonious oxide should be indicated. The oxide is not completely soluble in acid potassium tartrate solution after it has been kept for some time.

Antimony acts upon the skin as a severe irritant when applied externally, but is not much used for this property on account of its uncertainty. Internally, in large doses it gives rise to violent vomiting, due to its direct irritant action upon the stomach. Emesis is followed by depression and even collapse. In small doses, antimony is an expectorant and diaphoretic. Antimonious oxide is administered usually as *Pulvis Antimonialis*, or it may be given in pills. It possesses the same therapeutic properties as tartarated antimony, but in a milder degree, because of its comparative insolubility. The oxide is chiefly employed as a diaphoretic, and is understood to be an ingredient of James' Fever Powder, which was originally prepared by calcining antimony and hartshorn (see *Pulvis Antimonialis*).

*Dose*.—6 to 12 centigrams (1 to 2 grains).

### ANTIMONIUM NIGRUM PURIFICATUM.

ANTIMONIOUS SULPHIDE.



*Synonym*.—Black Antimony.

Antimonious sulphide,  $\text{Sb}_2\text{S}_3$ , is the natural substance freed from siliceous matter and arsenium, by fusion and subsequent digestion of the powdered sulphide with ammonia.

It occurs as a nearly black crystalline powder, insoluble in water, but almost entirely soluble in hot hydrochloric acid, with evolution of hydrogen sulphide. It should not contain more than traces of arsenium.

Antimonious sulphide is used to prepare Antimonium Sulphuratum.

### ANTIMONIUM SULPHURATUM.

SULPHURATED ANTIMONY.

Sulphurated antimony is prepared by the following process:—Dissolve 25 of caustic soda in 500 of distilled water, add 50 of antimonious sulphide and 50 of sublimed sulphur, and boil for two hours, stirring frequently and occasionally adding distilled water to replace that lost by evaporation; while the mixture is still hot add 900 of boiling distilled water, strain through calico, and gradually add diluted sulphuric acid until it is present in slight excess. Finally, collect and wash the precipitate on a calico filter, until the water used for washing shows no trace of sulphates, and dry the sulphurated antimony at a temperature not exceeding  $100^\circ$ . The product contains antimony sulphides, antimony oxides, and free sulphur.



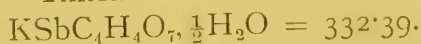
It occurs as an amorphous orange-red powder, without taste or odour. Insoluble in water and in alcohol, and not readily soluble in solution of sodium hydroxide. Treated with hot hydrochloric acid it decomposes, hydrogen sulphide being evolved and sulphur deposited. If 3 grammes of sulphurated antimony, prepared as described, be moistened and warmed with successive portions of nitric acid until red fumes cease to be evolved, and then dried and heated to redness, the weight of the whitish residue will not exceed 1.6 to 1.8 grammes. If 1 gramme be shaken with 20 mls of hot water, the filtrate should be neutral to test-paper. It should not give more than the slightest characteristic reactions for sulphates, chlorides, and arsenium, and should be free from calcium. The hydrochloric acid solution, completely deprived of hydrogen sulphide by boiling, yields when added to water a white precipitate, which, after washing and drying, should weigh not less than 85 per cent. of the original weight of the sulphide.

Sulphurated antimony is contained in *Pilula Hydrargyri Subchloridi Composita*, for use as a cholagogue in gout and rheumatism. It is also employed as a diaphoretic and in skin diseases, but is less used than formerly. A similar preparation, of a dull red colour, prepared without added sulphur, is known on the Continent as *Kermes mineral*. *Crocus antimony* is a liver-brown insoluble powder consisting of about four-fifths of antimonious oxide with one-fifth of antimonious sulphide. It is prepared by deflagrating a mixture of antimonious sulphide, potassium nitrate, and sodium chloride. The product is employed in veterinary practice.

*Dose.*—6 to 12 centigrams (1 to 2 grains).

## ANTIMONIUM TARTARATUM.

TARTARATED ANTIMONY.



*Synonyms.*—*Antimonii et Potassii Tartras*; *Tartar Emetic*; *Potassio-tartrate of Antimony*.

Tartarated antimony, or antimony and potassium tartrate,  $\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6, \frac{1}{2}\text{H}_2\text{O}$ , is prepared by allowing antimonious oxide to react with acid potassium tartrate, in the presence of water.

It occurs in colourless transparent rhombic crystals which become opaque on exposure to air, or as a white, minutely crystalline powder. Soluble in cold water (1 in 17), more soluble in boiling water (1 in 3), almost insoluble in alcohol, but moderately soluble in weak alcohol. It should be free from lead, copper, arsenium, iron, calcium, sodium, ammonium, chlorides, sulphates, and free acid. It should dissolve slowly but completely in 15 parts of water at 15.5°. Titrated, after the addition of sodium bicarbonate, with standard solution of iodine, not less than 99.2, and not more than 100 per cent. of crystallised tartarated antimony should be indicated.

This compound is generally employed when it is desired to obtain the effects characteristic of antimony (see *Antimonii Oxidum*). It may

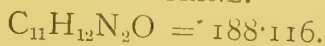
be given in aqueous mixtures, or in the form of Vinum Antimoniale; it may also be given in pills made up with milk sugar and a little liquid glucose. Externally it is applied in the form of an ointment (Unguentum Antimonii Tartarati). Tartarated antimony is incompatible with alkalies and their carbonates, lead salts, tannin, all astringent preparations, and mucilage of acacia. In cases of poisoning by this substance tannic acid should be given, dissolved in water, in doses of 3 to 12 decigrams (5 to 20 grains), and the stomach well washed out.

*Dose*.—As a diaphoretic, 3 to 8 milligrams ( $\frac{1}{27}$  to  $\frac{1}{5}$  grain); as an emetic, 6 to 12 centigrams (1 to 2 grains).

NOTE.—Solution of tartarated antimony is prepared by dissolving 5 of the compound in sufficient boiling distilled water to produce 100; it should be freshly prepared, as required.

## ANTIPYRINA.

### ANTIPYRINE.



*Synonyms*.—Phenazone; Phenyl-dimethyl-iso-pyrazolon.

Antipyrine,  $\text{C}_6\text{H}_5(\text{CH}_3)_2\text{C}_3\text{HN}_2\text{O}$ , may be prepared by heating phenylhydrazin with aceto-acetic ether, whereby phenyl-methyl-isopyrazolon is produced; this compound is dissolved in methyl alcohol and treated with methyl iodide. The addition compound thus formed—antipyrine hydriodide—splits off hydriodic acid on treatment with solution of sodium hydroxide, antipyrine separating as a heavy oil, which may then be crystallised from toluene or ether.

It occurs in the form of pearly crystalline scales, tabular crystals, or as a crystalline powder, colourless or nearly so, almost inodorous, and having a mild bitter taste. Soluble in water (1 in  $1\frac{1}{4}$ ), in alcohol (3 in 4), in chloroform (about 5 in 6), in ether (1 in 40). The aqueous solution is neutral to litmus paper, and should not be affected by hydrogen sulphide. Melting-point, about  $113^\circ$ ; when further heated it turns red, then brown, and acquires an empyreumatic odour; ignited with free access of air it leaves no residue (absence of inorganic impurities). An admixture with acetanilide lowers the melting-point considerably (even down to  $45^\circ$ ), although both have nearly the same melting-point. Antipyrine is a strong base and unites directly with acids to form salts. Chloroform extracts it from alkaline solutions, but not completely from acid solutions. A very dilute aqueous solution with ferric chloride solution gives a deep red colour (limit of the reaction, 1 : 100000), which is nearly discharged by excess of diluted sulphuric acid. If 1 decigram of sodium nitrite be added to 12 mils of a 1 per cent. aqueous solution the nearly colourless liquid which results turns deep green on the addition of 1 mil of diluted sulphuric acid (isonitroso-antipyrine; limit of the reaction, 1 : 10000). A 1 per cent. aqueous solution with an equal volume of nitric acid assumes a yellow colour, passing to crimson on warming (distinction from acetanilide

and phenacetin). A 5 per cent. aqueous solution gives with solution of mercuric chloride a white precipitate which disappears on boiling, but reappears as the liquid cools. Two mls of a 1 per cent. aqueous solution should be coloured green by 1 decimil of fuming nitric acid, and the colour should be changed to red by boiling with an additional 3 or 4 drops of the acid. An aqueous solution with solution of tannic acid produces an abundant white precipitate of tannate. Acid solutions of antipyrine give a precipitate with Mayer's reagent and with some other alkaloidal precipitants. On warming 1 decigram with solution of sodium hydroxide and again warming after the addition of a few drops of chloroform, no disagreeable odour of phenyl isocyanide should be developed (absence of acetanilide).

Antipyrine is especially valuable as an analgesic. Its action is very similar to that of phenacetin; but, being more soluble in water, antipyrine acts more rapidly, though for a shorter time. It is more toxic than phenacetin, on account of the more rapid absorption, and is excreted in the urine unchanged. The addition of aromatic spirit of ammonia to mixtures containing antipyrine is recommended as a means of obviating any tendency to collapse. Its action varies with the dose, and ceases as soon as excretion has taken place. It sometimes causes rashes and other untoward symptoms, though not so commonly as acetanilide. Antipyrine is usually given in powders, cachets, capsules, effervescent granules, and mixtures. It is incompatible with Spiritus Ætheris Nitrosi or other nitrites in acid solution, also with the cinchona alkaloids and tannic acid in aqueous solution; with sodium salicylate in the dry state it forms an oily liquid on exposure of the mixed solids to air, and it acts similarly with butyl-chloral hydrate and  $\beta$ -naphthol.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

NOTES.—Antipyrine is also known under the trade-names Analgesine and Anodynin. The name phenazone should not now be associated with antipyrine, as it has been applied to a totally different substance (see Phenazonum), which is not used in medicine.

## ANTIPYRINA EFFERVESCENS.

### EFFERVESCENT ANTIPYRINE.

Antipyrine, in powder ... ..	8.00
Sodium Bicarbonate, in powder ... ..	46.00
Tartaric Acid, in powder ... ..	24.00
Citric Acid, in powder ... ..	16.00
Refined Sugar, in powder ... ..	16.00

Mix and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100. It contains approximately one-twelfth its weight (5 grains in 60 grains) of antipyrine.

*Dose.*—4 to 8 grammes (60 to 120 grains).



**ANTIPYRINA EFFERVESCENS CUM CAFFEINA.**

EFFERVESCENT ANTIPYRINE WITH CAFFEINE.

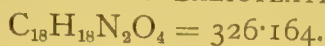
Antipyrine, in powder	...	...	...	8.00
Caffeine Citrate...	...	...	...	1.50
Sodium Bicarbonate, in powder	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	24.00
Citric Acid, in powder	...	...	...	16.00
Refined Sugar, in powder	...	...	...	14.50

Mix and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100. It contains approximately one-twelfth its weight (10 grains in 120 grains) of antipyrine, and one-sixtieth its weight (2 grains in 120 grains) of caffeine citrate.

*Dose*.—4 to 8 grammes (60 to 120 grains).

**ANTIPYRINÆ SALICYLAS.**

ANTIPYRINE SALICYLATE.

*Synonym*.—Phenazone Salicylate.

Antipyrine salicylate,  $\text{C}_{11}\text{H}_{12}\text{N}_2\text{O} \cdot \text{HC}_7\text{H}_5\text{O}_3$ , may be prepared by heating on a water-bath a mixture of antipyrine and salicylic acid in molecular proportions. The mixture melts, yielding an oily liquid which solidifies on cooling, and may be purified by recrystallisation from alcohol. It may also be obtained by shaking an aqueous or chloroformic solution of antipyrine with an ethereal solution of salicylic acid, when the antipyrine salicylate separates slowly in fine crystals. It should contain 57.7 per cent. of antipyrine and 42.3 per cent. of salicylic acid.

It occurs in the form of hexagonal laminæ, or as a crystalline powder, colourless, odourless, and having a sweetish bitter, not disagreeable taste, and an acid reaction. Soluble in cold water (1 in 240), in boiling water (1 in 25), in alcohol (1 in 4), in ether, chloroform, benzol; slightly soluble in carbon disulphide. Melting-point, 92°. It is decomposed by acids and alkalies. Heated with diluted sulphuric acid it yields salicylic acid, and with solution of sodium hydroxide antipyrine is liberated. Its aqueous solution, treated with solution of ferric chloride, gives the violet coloration characteristic of salicylic acid. The salt may be assayed by dissolving 1 gramme in 40 mls of hot water, adding 10 mls of normal solution of sodium hydroxide and shaking out the liberated antipyrine with 15 mls of chloroform three or four times. The chloroform is evaporated and the residue of antipyrine weighed and its melting-point taken. The sodium salicylate formed at the same time is determined by titrating the excess of alkali with normal solution of sulphuric acid, using phenol-phthalein as indicator, and the salicylic acid may be shaken out with ether, the latter evaporated

and the melting-point of the residual acid taken. Other tests described under the names of the respective substances may also be applied.

Antipyrine salicylate is decomposed in the duodenum, and there absorbed as sodium salicylate and antipyrine. It may therefore be prescribed in any condition in which a combination of those two remedies is desirable. Thus, it is given in acute and chronic rheumatism, and in sciatica. It is also of great use for reducing fever in influenza, and checking acute catarrh. It may be given in cachets, or suspended in water with compound powder of tragacanth.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

*NOTE.*—Antipyrine salicylate is also known under the trade-names Salipyrine Salazolon, and Salipyrizolon.

## APIOL.

APIOL.

*Synonym.*—Liquid Apiol.

Apiol, as found in commerce, is usually prepared by extracting the bruised fresh fruits of parsley, *Carum Petroselinum* (Benth. et Hook.), (N.O. Umbelliferæ), with ether, and distilling off the solvent. The residue is commercial liquid apiol.

Prepared as described, apiol is a greenish-brown, viscid, oily, resinous liquid, with a peculiar odour and a disagreeable, acrid taste. It is insoluble in water, but soluble in alcohol and in ether.

Crystallised apiol or parsley camphor (melting-point,  $29.5^{\circ}$  to  $30^{\circ}$ ) is a stearoptene which may be obtained from the volatile oil by cooling to a low temperature, when crystallisation takes place. In oil from German fruit it is present in such abundance as to render the oil semi-solid at ordinary temperatures (see *Oleum Petroselini*). It occurs in the form of white acicular crystals, having the formula  $C_{12}H_{14}O_4$ . It has a slight parsley-like odour and an aromatic burning taste. Insoluble, or only very slightly soluble, in water; readily soluble in alcohol, ether, and oils. Melting-point,  $30^{\circ}$ ; boiling-point,  $294^{\circ}$ . Not easily volatilised in aqueous vapour. It dissolves in strong sulphuric acid with a characteristic blood-red colour. Treatment with potassium permanganate yields apiolic acid ( $C_{10}H_{10}O_6$ ), melting-point,  $175^{\circ}$ . Boiling alcoholic solution of potassium hydroxide converts true apiol into an isomeric substance, isoapiol, melting at  $55^{\circ}$  to  $56^{\circ}$ , and boiling at  $304^{\circ}$ .

Liquid apiol has an action like that of essential oils generally. It is chiefly used in dysmenorrhœa and amenorrhœa, and, no doubt, acts by local reflex irritation during excretion by the urinary tract; it is also a diuretic. In large doses apiol sometimes produces effects like those of cinchonism, such as ringing in the ears, headache, and vertigo, and was at one time employed as an antiperiodic

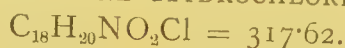
in ague. It is usually given in capsules or perles containing from 2 to 6 decimils (3 to 10 minims).

*Dose.*—2 to 6 decimils (3 to 10 minims).

NOTES.—The dose of crystallised apiol is from 2 to 3 decigrams (3 to 5 grains). Another apiol is that obtained from oil of Indian dill (*Peucedanum Sowa*, Kurz.), (N.O. Umbelliferæ), and known as dill-apiol. It is an oily liquid, not crystallisable, boiling at 285° with slight decomposition. It has the same composition as that obtained from parsley, viz.,  $C_{12}H_{14}O_4$ , and yields crystalline dill-isoapiol when heated with sodium ethylate. Dill-isoapiol melts at 44° and boils at 296°. Apiolin is prepared by saponifying commercial liquid apiol by means of caustic alkali and subsequently distilling. It occurs as a pale yellow neutral liquid, having a pungent taste and smell. Soluble in alcohol. Specific gravity, 1.125 to 1.135. Boiling-point, 280° to 300°. Dose: 4 to 8 decigrams (6 to 12 grains).

## APOCODEINÆ HYDROCHLORIDUM.

APOCODEINE HYDROCHLORIDE.



Apocodeine hydrochloride,  $C_{18}H_{19}NO_2HCl$ , is the salt of a base obtained by the action of zinc chloride and hydrochloric acid on codeine.

It occurs as a yellowish or greenish-grey hygroscopic, amorphous, powder. Freely soluble in water; less soluble in alcohol.

Apocodeine has an action similar to that of apomorphine, except that it is a more pronounced expectorant, does not, except in very large doses, cause emesis, and has a very decided action on sympathetic and autonomic nerve cells. On account of its latter action, whereby inhibitory influences are paralysed, the movements of plain muscle throughout the body are increased; apocodeine has therefore been recommended for use as a hypodermic purgative. In the case of healthy people it is generally efficient in producing one or more stools within ten minutes after the injection: but is only likely to be valuable in therapeutics for those cases in which constipation is due to excessive inhibition. Where constipation is caused by inertia of the muscle it is not likely to be of use. Apocodeine hydrochloride may be used internally in the form of a solution, and in pills; or it may be employed as a hypodermic or, better, intra-muscular injection, 2 mils (30 minims) of a 1 per cent. solution for a dose.

*Dose.*—6 to 60 milligrams ( $\frac{1}{10}$  to 1 grain); by injection, 10 to 30 milligrams ( $\frac{1}{6}$  to  $\frac{1}{2}$  grain).

## APOCYNUM.

APOCYNUM.

*Synonym.*—Canadian Hemp.

Apocynum consists of the rhizome and root of *Apocynum cannabinum*, Linn. (N.O. Apocynaceæ), an herbaceous plant growing in the United States and Canada.



The root occurs in long cylindrical simple or branched, often tortuous, pieces, from 5 to 10 millimetres thick, and of a grey or brownish-grey colour; they are longitudinally wrinkled, and transversely fissured at somewhat distant intervals. The smoothed section exhibits a thick, pale brownish-grey cortex, enclosing a large, yellowish wood. In the cortex numerous laticiferous vessels may be recognised by their brownish contents. The wood contains small vessels and numerous delicate medullary rays. The drug is inodorous, but has a disagreeable, very bitter taste.

The chief constituents of apocynum are the two glucosides apocynin and apocynein; it also contains tannin, resin, and starch.

Apocynum belongs to the group of cardiac tonics, and has an action corresponding in the main with that of digitalis. It has been largely used in America, where it has been termed the "vegetable trocar," on account of its supposed efficiency in removing cardiac dropsy. It differs from digitalis in being much more irritant to the gastro-intestinal canal, even causing gastric ulcerations in large doses; and, after absorption, it constricts the vessels more, and therefore increases blood pressure. It is therefore indicated in all conditions in which the use of digitalis appears advisable, and has no action on the kidneys except by increasing the efficiency of the heart. On the whole, it is better to avoid the use of this very irritant drug; and when it is desired to raise blood pressure more than can be effected by digitalis, squill should be preferred. The drug may be given in powder, but it is usually administered as a liquid extract (1 in 1), or in the form of infusion (1 in 40).

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTES.*—The roots of *Apocynum cannabinum* and *A. androsaefolium* have sometimes been mistaken for each other, but the latter has a <sup>mi</sup>thicker bark, a white porous wood, and contains in the outer portion groups of stone cells, which can be detected by the phloroglucin test.

## APOMORPHINÆ HYDROCHLORIDUM.

APOMORPHINE HYDROCHLORIDE.



*Synonym.*—Apomorphinæ Hydrochloras.

Apomorphine hydrochloride,  $\text{C}_{17}\text{H}_{17}\text{NO}_2$ , HCl, is the salt of a base which is formed on heating morphine or codeine with hydrochloric acid in a sealed tube.

It occurs as a greyish-white, shining, crystalline powder, which becomes green on exposure to air and light. Soluble in water (1 in 60) and alcohol (1 in 50), the solutions becoming green and decomposing on heating. The salt is neutral or very slightly acid to litmus. If it gives a green colour when shaken with 100 parts of water it should not be used.

Apomorphine has the action of morphine, depressing sensory nerve cells in the brain and so relieving pain. But it has a decided stimulant action on the medulla, and is employed almost entirely to produce emesis. If injected hypodermically 6 milligrams ( $\frac{1}{10}$  grain) of the hydrochloride will produce vomiting in a few minutes. Taken by the mouth the same dose would act merely as an expectorant and diaphoretic, increasing and rendering less tenacious the bronchial mucus. It is given in the form of syrup containing 2 milligrams in 4 mils ( $\frac{1}{32}$  grain in 1 fluid drachm). When used as an emetic it is given as *Injectio Apomorphinæ Hypodermica* (1 per cent.). For convenience in the preparation of hypodermic solutions, the salt is made into tablets of different strengths, namely, 3, 4 and 6 milligrams ( $\frac{1}{20}$ ,  $\frac{1}{15}$ , and  $\frac{1}{10}$  grain). It is incompatible with alkaline substances. An aqueous solution of the salt becomes green on keeping, but this may be prevented by adding a few drops of diluted hydrochloric acid.

*Dose.*—2 to 4 milligrams ( $\frac{1}{32}$  to  $\frac{1}{16}$  grain) as an expectorant; 6 to 16 milligrams ( $\frac{1}{10}$  to  $\frac{1}{4}$  grain), as an emetic; 3 to 6 milligrams ( $\frac{1}{20}$  to  $\frac{1}{10}$  grain) by hypodermic injection.

*NOTE.*—Apomorphine hydrochloride should be kept in small, amber-coloured bottles, which have been rinsed with diluted hydrochloric acid and thoroughly dried.

### AQUA.

#### WATER.

$H_2O = 18.016$ .

Water in the purest natural state obtainable may be used for aqueous solutions, etc., when distilled water is not specified, but distilled water should always be employed in dispensing.

### AQUA AMYGDALÆ AMARÆ.

#### BITTER ALMOND WATER.

Oil of Bitter Almonds	...	...	...	...	0.10
Distilled Water	...	...	...	...	100.00

Shake the oil with the distilled water, and filter.

Bitter almond water is used as a flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Aqua Amygdalæ Amaræ, U.S.P., contains a very small proportion of hydrocyanic acid.

### AQUA ANETHI.

#### DILL WATER.

Dill Fruit	...	...	...	...	10.00
Water	...	...	...	...	200.00

Add the fruit to the water, and distil 100.

Dill water is employed chiefly as a carminative for flatulence in children.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**AQUA ANISI.**

## ANISE WATER.

Anise Fruit	...	...	...	...	...	10'00
Water	...	...	...	...	...	200'00

Add the fruit to the water, and distil 100.

Anise water is used as a carminative for children, and as a flavouring agent.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**AQUA ANTHEMIDIS.**

## CHAMOMILE WATER.

Chamomile Flowers	...	...	...	...	...	10'00
Water...	...	...	...	...	...	200'00

Add the flowers to the water, and distil 100.

Chamomile water is an aromatic and stomachic vehicle for use in mixtures.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**AQUA AURANTII FLORIS.**

## ORANGE-FLOWER WATER.

*Synonyms.*—Aqua Naphæ; Aqua Aurantii Florum Fortior; Stronger Orange-flower Water.

Orange-flower water is obtained by distilling the flowers of *Citrus Aurantium*, var. *Bigaradia*, Hook. f. (N.O. Rutaceæ), with water. It should be diluted with twice its volume of distilled water immediately before use, unless otherwise specified.

It occurs as a colourless or slightly greenish-yellow liquid, with a very fragrant odour. The water should be free from lead.

Orange-flower water is used as a flavouring agent, as in *Mistura Olei Ricini* and *Syrupus Calcii Lactophosphatis*; it is also used as a vehicle for lotions.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

*NOTE.*—Aqua Aurantii Florum, U.S.P., is prepared by mixing equal volumes of stronger orange-flower water and distilled water.

**AQUA BROMI.**

## BROMINE WATER.

Bromine, by volume	...	...	...	...	...	0'65
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Place the bromine and distilled water in a well-stoppered bottle and shake together until the bromine is dissolved.

Bromine water is a clear brownish-red liquid with the disagreeable irritating odour of bromine. It decolorises solutions of vegetable colouring matters, and gives a brown colour with solution of starch. It is completely volatilised on exposure to the air. Shaken with a slight excess of reduced iron until nearly colourless the filtered



liquid, on the addition of a small amount of solution of ferric chloride and solution of starch, should not assume a blue colour (absence of iodine).

NOTE.—This solution should be kept in glass-stoppered bottles in a dark place.

### AQUA CAMPHORÆ.

#### CAMPBOR WATER.

Camphor	...	...	...	...	...	0·10
Alcohol, a sufficient quantity.						
Distilled Water...	...	...	...	...	...	100·00

Dissolve the camphor in sufficient alcohol to produce 0·3, and add the solution gradually to the water, shaking after each addition until all the camphor is dissolved.

Camphor water is used chiefly for flavouring purposes, but has a mild carminative, diaphoretic, and expectorant action.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

### AQUA CARUI.

#### CARAWAY WATER.

Caraway Fruit ...	...	...	...	...	...	10·00
Water ...	...	...	...	...	...	200·00

Add the fruit to the water and distil 100.

Caraway water is used as a carminative and flavouring agent.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

### AQUA CHLORI.

#### CHLORINE WATER.

Chlorine water may be prepared by saturating distilled water with chlorine which has previously been purified by passing through a small quantity of water in a wash-bottle. The chlorine may be produced by the interaction of hydrochloric acid and manganese peroxide.

Chlorine water is a clear greenish-yellow liquid, with the suffocating odour of chlorine. It quickly decolorises solutions of vegetable colouring matters; it leaves no residue on evaporation.

NOTES.—This solution should be kept in completely filled glass-stoppered bottles in a cool dark place. It tends to extract lead from the glass in keeping.

### AQUA CHLOROFORMI.

#### CHLOROFORM WATER.

Chloroform	...	...	...	...	...	0·25
Distilled Water, sufficient to produce					...	100·00

Add the chloroform to the water and shake together until the chloroform is dissolved.

Chloroform water is employed for flavouring and as a very mild carminative.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

NOTES.—Aqua Chloroformi, B.P. 1885, was twice the strength of this preparation. Aqua Chloroformi, U.S.P., is prepared by saturating distilled water with chloroform, an excess of the latter being always present in the bottle.

### AQUA CHLOROFORMI DILUTA.

#### DILUTED CHLOROFORM WATER.

Chloroform	...	...	...	...	...	0·10
Distilled Water, sufficient to produce...	...	...	...	...	...	100·00

Add the chloroform to the water and shake together until the chloroform is dissolved.

NOTE.—This solution is used in the preparation of concentrated infusions.

### AQUA CINNAMOMI.

#### CINNAMON WATER.

Cinnamon Bark, bruised	...	...	...	...	10·00
Water	...	...	...	...	200·00

Add the bruised bark to the water and distil 100.

Cinnamon water is employed as a carminative in the colic and flatulence of children. It forms an ingredient of several official mixtures.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

### AQUA DESTILLATA.

#### DISTILLED WATER.

$H_2O = 18·016$ .

Distilled water is obtained by distilling good spring or tap water, the first portions of the distillate being rejected if a deep yellow tint is obtained with Nessler's reagent.

It is a colourless, tasteless, and odourless liquid. If 25 mils be evaporated in a platinum dish, not more than a slight trace of residue should be left. The water should be neutral to litmus paper, and free from metals, chlorides, nitrates, nitrites, sulphates, and organic matter. It is officially stated that the water should contain not more than 0·005 part of ammonia per million, but that standard is unnecessarily high for dispensing purposes.

### AQUA FÆNICULI.

#### FENNEL WATER.

Fennel Fruit	...	...	...	...	...	10·00
Water	...	...	...	...	...	200·00

Add the fruit to the water and distil 100.

Fennel water is used as an aromatic carminative, especially in the intestinal colic of children.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

**AQUA LAUROCERASI.**

## CHERRY-LAUREL WATER.

Fresh Cherry-laurel Leaves, crushed ...	...	80.00
Water ...	...	250.00

Add the crushed leaves to the water in a retort, distil 100, shake the distillate, and filter if necessary. Finally, adjust the strength of the product, either by adding hydrocyanic acid, or by diluting with water, so that it shall contain 0.1 per cent. of hydrocyanic acid.

Cherry-laurel water is employed occasionally for internal and external use as a sedative, in place of diluted hydrocyanic acid.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**AQUA MELLIS.**

## HONEY WATER.

Oil of Bergamot ...	...	0.75
Oil of Lavender ...	...	0.25
Oil of Cloves ...	...	0.25
Oil of Sandal Wood ...	...	0.05
Tincture of Musk ...	...	1.50
Tincture of Saffron ...	...	0.75
Rose Water (undiluted)...	...	16.00
Orange-flower Water (undiluted)	...	16.00
Honey ...	...	0.50
Alcohol, sufficient to produce ...	...	100.00

Dissolve the oils in the alcohol and tinctures, and add the honey mixed with the rose and orange-flower waters.

Honey water is employed in the preparation of hair-washes and articles for the toilet.

**AQUA MENTHÆ PIPERITÆ.**

## PEPPERMINT WATER.

Oil of Peppermint ...	...	0.10
Water ...	...	150.00

Add the oil to the water and distil 100.

Peppermint water forms a convenient vehicle for mixtures. Its carminative properties are useful in association with stomachics and purgatives such as rhubarb and magnesium sulphate.

*Dose.*—30 to 60 mls (1 to 2 fluid ounces).

**AQUA MENTHÆ VIRIDIS.**

## \* SPEARMINT WATER.

*Synonym.*—Aqua Menthæ.

Oil of Spearmint ...	...	0.10
Water ...	...	150.00

Add the oil to the water, and distil 100.



Spearmint water has properties similar to those of peppermint water.

*Dose*.—30 to 60 mils (1 to 2 fluid ounces).

### AQUA MENTHOLIS.

#### MENTHOL WATER.

Menthol ...	...	...	...	...	...	0·10
Alcohol ...	...	...	...	...	...	0·15
Distilled Water ...	...	...	...	...	...	100·00

Dissolve the menthol in the alcohol, add the solution to the water, shake well, and filter after twenty-four hours.

Menthol water is employed as a vehicle for alkaline and antiseptic solutions for the throat and nose. It may also be used as a carminative and antispasmodic in place of peppermint water.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### AQUA PICIS.

#### TAR WATER.

Tar ...	...	...	...	...	...	10·00
Distilled Water ...	...	...	...	...	...	100·00

Add the tar to the distilled water, stir together for fifteen minutes, decant the supernatant liquid, and filter through paper.

Tar water is used as a mild antiseptic and expectorant in bronchitis and chronic cough.

*Dose*.— $\frac{1}{2}$  litre (18 fluid ounces) or more, daily.

### AQUA PIMENTÆ.

#### PIMENTO WATER.

Pimento, bruised ...	...	...	...	...	...	5·00
Water ...	...	...	...	...	...	200·00

Add the bruised pimento to the water, and distil 100.

Pimento water is an aromatic and stimulant carminative.

*Dose*.—30 to 60 mils (1 to 2 fluid ounces).

### AQUA ROSÆ.

#### ROSE WATER.

*Synonyms*.—Aqua Rosæ Fortior; Stronger Rose Water.

Rose water is obtained by distilling the flowers of *Rosa damascena*, Linn. (N.O. Rosaceæ), with water. It should be diluted with twice its volume of distilled water immediately before use, unless otherwise specified.

Rose water is prescribed in lotions for its fragrant odour, and as a mild astringent. It is a constituent of Mistura Ferri Composita, and is used in the preparation of the official rose basis for lozenges, as a flavouring agent.

NOTE.—Aqua Rosæ, U.S.P., is prepared by mixing equal volumes of stronger rose water and distilled water.

**AQUA SAMBUCI.****ELDER-FLOWER WATER.**

Elder Flowers, fresh	...	...	...	...	100·00
Water	...	...	...	...	500·00

Add the flowers to the water, and distil 100.

Elder-flower water is mildly astringent and is used as a vehicle for eye and skin lotions. The product gradually acquires an agreeably aromatic odour, and it is preferable not to use it until this change has taken place.

NOTE.—If fresh elder flowers are not obtainable, an equivalent quantity of the flowers preserved with common salt may be used.

**AQUÆ CONCENTRATÆ.****CONCENTRATED WATERS.**

Concentrated waters are solutions of volatile oils, etc., for the extemporaneous production of medicated waters. They are prepared by dissolving the oil or other medicament in alcohol, and, except in the case of chloroform, adding distilled water in successive portions, shaking well after each addition. One part of the filtered solution corresponds to about 40 parts of the official medicated water.

AQUA ANETHI CONCENTRATA	.....	: oil, 12·5 ; alcohol, 70 ; water to 100.
„ ANISI CONCENTRATA	.....	: oil, 5 ; alcohol, 70 ; water to 100.
„ CAMPHORÆ CONCENTRATA	..	: camphor, 3·75 ; alcohol, 41·25 ; water to 100.
„ CARUI CONCENTRATA	.....	: oil, 10 ; alcohol, 70 ; water to 100.
„ CHLOROFORMI CONCENTRATA		: chloroform, 20 ; alcohol to 100.
„ CINNAMOMI CONCENTRATA	..	: oil, 4·75 ; alcohol, 76 ; water to 100.
„ FENICULI CONCENTRATA	....	: oil, 7·5 ; alcohol, 80 ; water to 100.
„ MENTHÆ PIPERITÆ CONCENTRATA	.....	: oil, 3·75 ; alcohol, 80 ; water to 100.
„ MENTHÆ VIRIDIS CONCENTRATA	.....	: oil, 3·75 ; alcohol, 80 ; water to 100.
„ PIMENTÆ CONCENTRATA	....	: oil, 7·5 ; alcohol, 80 ; water to 100

**AQUÆ MEDICATÆ.****MEDICATED WATERS.**

Medicated waters may be prepared extemporaneously from the corresponding volatile oils by the following process:—

Volatile Oil	...	...	...	...	0·20
Calcium Phosphate	...	...	...	...	0·40
Distilled Water	...	...	...	...	100·00

Triturate the oil with the calcium phosphate, and add the water gradually, triturating constantly; filter, and pass sufficient distilled water through the filter to produce 100.

NOTES.—The above process is sanctioned for use in India and other tropical countries in making the following waters:—

Aqua Anethi	Aqua Fœniculi
" Anisi	" Menthæ Piperitæ
" Carui	" Menthæ Viridis
" Cinnamomi	" Pimentæ

Aquæ, U.S.P., are prepared from volatile oils by triturating 2 of the oil with 15 of purified talc, or pulped or shredded filter paper; then adding gradually sufficient distilled water to produce 1000, and filtering. A simpler process, which yields satisfactory products, is to add the volatile oil in successive portions to hot water, shaking after each addition, then cooling, and finally filtering through two layers of filter paper; the use of kieselguhr as a filtering medium has been suggested in Australia.

## ARAROA.

### ARAROA.

*Synonyms.*—Crude Chrysarobin; Goa Powder.

Araroba or Goa powder is a substance found in the trunk of *Andira Araroba*, Aguiar (N.O. Leguminosæ), a large tree growing in the damp forests of Bahia (Brazil). It is scraped out of the cavities together with woody debris, and is exported in a crude and moist condition as an umber-brown powder, containing numerous fragments of wood. It is roughly freed from the moisture and much of the woody debris by drying and sifting. It may be further purified by exhausting with hot chloroform or benzene, evaporating the solution to dryness, and powdering the residue. It is stated, however, that by this method an active constituent insoluble in chloroform and benzene is left in the drug. Another method of purification is to boil the crude drug with solution of caustic potash, filter, and reprecipitate by acidifying the dark coloured solution with hydrochloric acid.

The drug occurs as a brownish-yellow to dark brown powder, which should yield not less than 50 per cent. to hot chloroform, while as much as 75 per cent. is sometimes obtained. When heated, the purified substance melts, evolving yellow fumes, and finally burns, leaving not more than 1 per cent. of ash.

Purified araroba consists largely of chrysarobin, but also contains di-chrysarobin, the methyl ether of dichrysarobin, and a fourth substance which awaits further investigation; all of these are soluble in chloroform. Crude araroba contains in addition to these substances from 15 to 30 per cent. of moisture and varying quantities of woody debris.

Araroba resembles chrysarobin in its properties, and, in India, crude araroba is preferred to chrysarobin. An ointment of araroba is made by rubbing together 1 part of the powder with 1 part of glacial acetic acid and adding 14 parts of lard.

NOTE.—Araroba is used officially as the source of chrysarobin, but it has been asserted to be more efficacious than the latter, owing to the presence of an unknown active substance, which is not extracted by chloroform.



**ARECÆ SEMINA.**

## ARECA NUTS.

*Synonym.*—Betel Nuts.

Areca nuts are the seeds of *Areca Catechu*, Linn. (N.O. Palmæ), a plant cultivated in tropical India, and in the Philippine and East Indian Islands.

The seeds are about 25 millimetres long, and have the shape of a short, rounded cone. The surface is brown in colour, and marked with a network of paler depressed lines, running chiefly from the hilum. The seed is hard; a transverse section exhibits a marbled interior, dark brown lines alternating with white portions, the former being folds of the seed-coats, and the latter the endosperm. It has little odour, but an astringent, bitter taste.

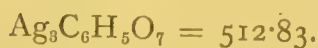
The chief constituent of the seeds, and the one upon which their vermifuge action depends, is the liquid volatile alkaloid arecoline,  $C_8H_{13}NO_3$  (0.1 per cent.), which yields crystallisable salts. Other alkaloids present in the drug are arecaidine, arecaine, guvacine, and choline. Arecaidine and arecaine are crystalline and isomeric, the former being converted into arecoline by introduction of the methyl group. The drug also contains 15 per cent. of a red amorphous tannin, 14 per cent. of fat, together with resin, mucilage, etc.

Areca is used chiefly in veterinary medicine as a vermifuge for tape worm; it is also mildly astringent, and is prescribed in the form of a confection consisting of the powdered seed and honey or syrup. The powder is employed in tooth pastes on account of its astringent effect upon the gums.

*Dose.*—1 to 4 grammes (15 to 60 grains).

**ARGENTI CITRAS.**

## SILVER CITRATE.



Silver citrate,  $Ag_3C_6H_5O_7$ , may be prepared by the interaction of silver nitrate and sodium citrate.

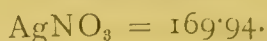
It occurs as a white, heavy, odourless powder. Very slightly soluble in water (1 in 3,800). On ignition it leaves 63 per cent. of metallic silver. It darkens on exposure to light.

Silver citrate is used as a dusting powder for keeping wounds and chronic ulcers sterile, and it is also occasionally used as an injection in chronic gonorrhœa and cystitis (about 1 in 7,000).

*NOTES.*—Silver citrate is also known under the trade-name Itrol. It should be kept in well-stoppered bottles, protected from the light.

**ARGENTI NITRAS.**

SILVER NITRATE.

*Synonym.*—Lunar Caustic.

Silver nitrate,  $\text{AgNO}_3$ , may be prepared by dissolving silver in nitric acid, and afterwards crystallising the salt.

It occurs in colourless transparent rhombic crystals. Very soluble in water (2 in 1); also soluble in alcohol (1 in 18), ether, and glycerin. It should be free from lead, copper, iron, sodium, potassium, and sulphates. On precipitating a solution of the nitrate with hydrochloric acid, the silver chloride formed should indicate 100 per cent. of silver nitrate, and the filtrate should leave no residue on evaporation.

Silver nitrate is a valuable caustic; it forms a thick coating of white albuminate, when applied to living tissues. The action is not deep, as the albuminate prevents penetration of the salt. It is used to destroy warts and other small skin growths and the false membranes of diphtheria, the skin being blackened by the silver nitrate. Dilute solutions are disinfectant and astringent; thus a solution of 1 in 1,000 forms a useful injection in chronic gonorrhœa; a 1 per cent. solution is employed in purulent ophthalmia, and stronger solutions to stimulate the healing of chronic ulcers. One objection to the local use of silver nitrate is that it is precipitated by chlorides, and it is for this reason that so many new silver compounds have been introduced. Silver salts taken internally are absorbed, and are deposited, combined with organic matter, in blue-grey granules. These granules are chiefly found in the connective tissue and produce the characteristic argyria. Silver nitrate pills have been used for dyspepsia, vomiting, gastric ulceration, and diarrhœa, and in epilepsy, chorea, and other nervous diseases. Clinical experience has shown that it is useless in epilepsy, and it is very doubtful if any silver ever reaches the central nervous system. If administered internally silver nitrate should be prescribed in the form of pills massed with kaolin ointment. It is used externally in aqueous solutions; as a collyrium (0.2 to 0.6 per cent.), application to the eyes (1 to 2 per cent.), injection into urethra (0.025 to 0.2 per cent.), application to ulcers of different kinds (2 to 6 per cent.). A 5 per cent. solution in spirit of nitrous ether forms a good means of application to the skin. For cauterising purposes it is made in sticks of two kinds, namely, mitigated caustic and toughened caustic; the former contains only one-third its weight of the silver salt. Silver nitrate is incompatible with alkalies, alkaline earths and their carbonates, hydrochloric and tartaric acids and their salts, bromides, iodides, phosphates, hydrocyanic acid and its salts, iodine, sulphur, arsenites and arsenical solutions, tannin and astringent preparations, resins, and all organic substances. In cases of poisoning with silver salts demulcent drinks with a good proportion of common salt should be given. After vomiting has been induced copious draughts of milk should be taken,

and, finally, a dose of castor oil. All solutions of silver salts should be dispensed in amber-coloured, glass-stoppered vials.

*Dose.*—15 to 30 milligrams ( $\frac{1}{4}$  to  $\frac{1}{2}$  grain).

*NOTES.*—Various silver preparations are now used as substitutes for the nitrate, the following being the chief :—Ethylene-diamine-silver phosphate (Argentamin), silver albuminate (Largin), silver caseinate (Argonin), silver citrate (Itrol), silver colloid (Collargol), silver fluoride (Tachiol), silver gelatose or glutin (Albargin), silver ichthosulphonate (Ichthargan), silver lactate (Actol), silver nucleinate (Nargol), silver oxychinolin-sulphonate (Argentol or Argentic Quinaseptol), silver proteinate (Novargan and Protargol), silver vitellin (Argyrol). Solution of silver nitrate is prepared by dissolving 5 of the salt in sufficient distilled water to produce 100. Solution of silver ammonio-nitrate is prepared by dissolving 2.5 of the nitrate in 80 of distilled water, cautiously adding solution of ammonia till the precipitate first formed is nearly dissolved, decanting the clear solution, and adding sufficient distilled water to produce 100.

### ARGENTI NITRAS INDURATUS.

TOUGHENED SILVER NITRATE.

*Synonyms.*—Toughened Caustic; Argenti Nitras Fusus.

Silver Nitrate ...	...	...	...	...	95.00
Potassium Nitrate .	...	...	...	...	5.00

Place the salts in a platinum or thin porcelain capsule, fuse, mix thoroughly, and pour the melted mass into suitable moulds.

Toughened caustic is used in preference to pure silver nitrate, because it is less brittle.

*NOTE.*—Argenti Nitras Fusus, U.S.P., is prepared by melting silver nitrate with 4 per cent. of hydrochloric acid.

### ARGENTI NITRAS MITIGATUS.

MITIGATED SILVER NITRATE.

*Synonyms.*—Mitigated Caustic; Argenti Nitras Dilutus.

Silver Nitrate ...	...	...	...	...	33.00
Potassium Nitrate .	...	...	...	...	66.00

Place the salts in a platinum or thin porcelain capsule, fuse, mix thoroughly, and pour the melted mass into suitable moulds.

Mitigated caustic is used when a weaker preparation than toughened caustic is required.

### ARGENTI OXIDUM.

SILVER OXIDE.

$\text{Ag}_2\text{O} = 231.86.$

*Synonym.*—Protoxide of Silver.

Silver oxide,  $\text{Ag}_2\text{O}$ , is precipitated on adding a slight excess of sodium, potassium, or calcium hydroxide to a solution of silver nitrate. The product should be well washed with recently boiled water, and dried below  $100^\circ$ .

The oxide occurs as a heavy, brownish-black, inodorous powder, having an unpleasant metallic taste. Slightly soluble in water, the solution having an alkaline reaction. When heated to  $100^\circ$ , or even at ordinary temperatures when exposed to light, it slowly loses



oxygen, and when heated to 250° rapid reduction to metallic silver ensues, with evolution of oxygen. It should be free from lead, copper, iron, and metallic silver, should dissolve readily and completely in nitric acid (absence of chloride), and when completely ignited should yield an amount of metallic silver corresponding to not less than 99·6 per cent. of pure silver oxide.

Silver oxide has been used internally for gastric pain and irritable dyspepsia, and also for hæmorrhage from the stomach and lungs and menorrhagia. As a remote astringent its action is irrational, as it is absorbed in minute amounts only. It has a milder and less irritating action than the nitrate, because of its slight solubility, it is given internally in pills massed with kaolin ointment. If prescribed with creosote, phenol, or other similar substance, it should first be mixed with some inert powder such as kaolin to mitigate the violence of its reduction. Silver oxide should not be prescribed with bromides, iodides, chlorides, acids, ammonia, tannin, and substances which are readily oxidisable. It may decompose with explosive violence if triturated with combustible or easily oxidisable substances.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

*NOTE.*—Silver oxide should be kept in amber-tinted bottles.

## ARGOL.

### ARGOL.

Argol is crude potassium hydrogen tartrate, formed as a deposit in wine casks; it is known as red argol or white argol, according to its origin from red or white wine respectively.

It occurs in crystalline crusts of a colour varying from pale yellowish-brown to dark red-brown. It is very variable in quality, containing from 40 and 70 per cent. of tartaric acid; some samples, especially from "plastered" wines, contain most of the tartaric acid as calcium tartrate, and not as potassium hydrogen tartrate. All samples contain calcium tartrate.

Argol is a source of potassium hydrogen tartrate, and of tartaric acid. The amount of tartrate present in argol may be determined by dissolving the argol in boiling water, filtering, adding potassium chloride to the filtrate, allowing to stand overnight, washing the precipitated cream of tartar with potassium chloride solution, and titrating with standard alkali. The total tartrate may be determined by neutralising with potassium carbonate a mixture of argol and boiling water, adding potassium acetate, boiling for five minutes, then cooling, filtering, and adding acetic acid to the filtrate. After standing, the precipitate is washed with a saturated solution of cream of tartar in potassium chloride solution, and titrated with normal alkali.

## ARISTOLOCHIA.

### ARISTOLOCHIA.

Aristolochia consists of the dried stem and root of *Aristolochia indica*, Linn. (N.O. Aristolochiaceæ), a shrubby, twining plant indigenous to India.

The stem, which forms the bulk of the drug, occurs in yellowish-brown more or less cylindrical pieces, usually varying from 5 to 10 millimetres in diameter, and bearing occasional scars of leaves and branches. The bark of the younger pieces is marked with conspicuous longitudinal furrows, but the older ones have a somewhat warty appearance. The transverse section exhibits a large porous wood traversed by a few medullary rays; the wood bundles are characterised by a disposition to divide dichotomously, owing to the production of secondary medullary rays. The root is tortuous, reddish-brown in colour, and exhibits occasional transverse constrictions. The bark, like that of the stem, is easily separated, disclosing a conspicuously furrowed wood, which has a structure resembling that of the stem. The drug has a camphoraceous odour, and a bitter camphoraceous taste.

The chief constituents of the drug are a bitter alkaloidal substance named aristolochine, and a volatile oil which probably contains borneol; the drug is also said to contain aristin, aristic acid, resin, tannin, and starch.

Aristolochia is used entirely for its bitter properties, its action resembling that of gentian and serpentary. The alkaloid aristolochine has an action like that of aloin, but is more toxic. In rabbits it causes necrotic nephritis with albuminuria and uræmic symptoms. It is administered in the form of the tincture and the concentrated solution.

NOTE.—Aristolochia is official in India and the Eastern Colonies, where it is used as an equivalent of serpentary rhizome.

### ARMORACIÆ RADIX.

#### HORSERADISH ROOT.

Horseradish root is obtained from *Cochlearia Armoracia*, Linn. (N.O. Cruciferae), a plant indigenous to Eastern Europe, but naturalised and cultivated in Britain. The fresh roots of cultivated plants are alone official. They can be collected all the year round, but are most active in autumn and early spring before the leaves appear.

The root is nearly cylindrical in shape, 30 centimetres or more in length, and 12 to 25 millimetres in diameter; externally it is pale yellowish-white, internally almost white, and when scraped or bruised a characteristic pungent odour is developed. Taste, pungent.

The drug contains the glucoside sinigrin (potassium myronate), which is decomposed in the presence of water by the enzyme myrosin, which is also present in the root. The products of the decomposition are a volatile oil (allyl isothiocyanate), acid potassium sulphate, and dextrose. The root also contains resin, sugar, and starch.

Horseradish is employed mainly as a condiment for stimulating digestion. It has the same action as the peppers and more irritant

volatile oils, and has been used as a diuretic. Spiritus Armoraciæ Compositus is official, and an infusion of the drug may be used as a gargle, or taken as a stimulant.

### ARNICÆ FLORES.

#### ARNICA FLOWERS.

*Synonym.*—Arnica.

Arnica flowers are the dried flower-heads of *Arnica montana*, Linn. (N.O. Compositæ), a small plant indigenous to Central Europe. The flower-heads are collected entire and dried, but the receptacles are sometimes removed as they are liable to be attacked by insects.

The involucre of arnica flowers consists of two rows of dark green, linear-lanceolate pubescent bracts. The ray florets number about sixteen and possess when fresh, conspicuous, orange-yellow, ligulate corollas traversed by seven to nine veins and terminating in three teeth; during the drying these corollas shrivel very much. The disc florets are numerous and remarkable for the single row of long white barbed bristles, which crowns the fruit. The latter is five-ribbed and covered with appressed hairs. The odour is aromatic and the taste bitter and acrid.

The chief constituents of arnica flowers are a bitter, crystalline body, arnicin; a volatile oil (0.5 to 1.0 per cent.), resin, and a colourless crystalline phytosterin which has been termed arnisterin. The drug should yield about 6 per cent. of ash.

Arnica has an irritant effect upon the stomach and intestines, and may induce paralysis of the nervous centres. It is rarely given internally, but a tincture is used, diluted with water (1 in 40), as a local application to sprains and bruises. When the skin is delicate arnica may cause extensive dermatitis, and it should not be employed if the skin is broken.

NOTES.—Arnica flowers are used in preference to arnica rhizome in the North American Colonies. The flower-heads of *Inula britannica*, Linn., are occasionally offered as arnica flowers, but the latter are easily identified by the three-toothed, seven to nine-veined ligulate corolla, and straight hairy fruit surmounted by a pappus of barbed bristles.

### ARNICÆ RHIZOMA.

#### ARNICA RHIZOME.

*Synonyms.*—Arnica Radix; Arnica Root.

Arnica rhizome is obtained from *Arnica montana*, Linn. (N.O. Compositæ), a small plant indigenous to Central Europe. The rhizome and rootlets should be collected in the autumn, after the stem has died down.

The horizontal, cylindrical rhizome is dark brown in colour, varying from 2.5 to 5 centimetres in length, and from 4 to 6 millimeters in thickness. It is usually curved, and bears on its under surface brittle



wiry rootlets. The surface is rendered rough by the scars left when these break off, together with the encircling scars of cataphyllary leaves. It is often terminated by the hairy remains of the stem and leaves. The transverse section exhibits a rather thick yellowish cortex, near the inner margin of which is a circle of dark oleo-resin ducts.

Arnica rhizome contains from 0.5 to 1.0 per cent. of volatile oil, with a pungent, aromatic taste, and a bitter principle, which is probably similar to, or identical with, that of the flowers. Tannin and inulin are also present, but the drug is free from starch. It yields about 8 per cent. of ash.

The action of arnica rhizome is the same as that of the flowers, and a tincture mixed with water (1 in 40) is a popular application for sprains and bruises when the skin is unbroken.

NOTES.—Arnica rhizome is not often adulterated, but foreign rhizomes are occasionally present; the genuine drug may readily be distinguished by the characters given.

## ARSENII BROMIDUM.

ARSENIOUS BROMIDE.



Arsenious bromide,  $\text{AsBr}_3$ , may be prepared by the direct combination of arsenium and bromine.

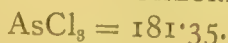
It occurs in white or yellowish-white, deliquescent crystals, which are decomposed by water, arsenious oxybromide being formed. Melting-point,  $20^\circ$  to  $25^\circ$ ; boiling-point,  $220^\circ$ .

The action of arsenious bromide is the same as that of arsenious acid. The salt should be prescribed in pills massed with milk sugar and glycerin of tragacanth, and not in aqueous solution, as water decomposes it. The most usual combination of arsenium and bromine is Clemens' solution (*Liquor Potassii Arseniatis et Bromidi*), which contains potassium arseniate and bromide.

*Dose*.—1 to 4 milligrams ( $\frac{1}{80}$  to  $\frac{1}{15}$  grain).

## ARSENII CHLORIDUM.

ARSENIOUS CHLORIDE.



Arsenious chloride,  $\text{AsCl}_3$ , may be prepared by the direct combination of arsenium and chlorine.

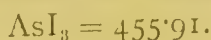
It occurs as a colourless, oily, fuming, and exceedingly poisonous liquid. Boiling-point,  $130^\circ$ . Specific gravity, 2.205 at  $0^\circ$ . With small quantities of water it is decomposed into arsenious oxychloride, with large quantities into arsenious oxide, hydrochloric acid being formed at the same time. It mixes with alcohol, ether, and oils.

Arsenious chloride is rarely prescribed.

*Dose*.—1 to 4 milligrams ( $\frac{1}{80}$  to  $\frac{1}{15}$  grain).

**ARSENII IODIDUM.**

ARSENIOUS IODIDE.

*Synonym.*—Arseni Iodidum; Arsenous Iodide.

Arsenious iodide,  $\text{AsI}_3$ , may be prepared by directly combining arsenium and iodine.

It occurs in small crystals or crystalline masses of an orange-red colour. Soluble in water (1 in 11), alcohol (1 in 42), and carbon bisulphide (1 in 19). It should volatilise completely on heating. The official statement that its aqueous solution is neutral to litmus is incorrect, as on dissolving in water it is hydrolysed with the production of hydriodic and arsenious acids, the solution having an acid reaction. The proportion of arsenium may be determined by dissolving in water, adding sodium bicarbonate, and titrating with iodine.

Arsenious iodide has an action similar to that of arsenious acid. It may be administered in pills massed with milk sugar and glycerin of tragacanth. More generally it is given in mixtures in the form of Donovan's solution (*Liquor Arsenii et Hydrargyri Iodidi*), but this solution should not be prescribed with alkaloids or mercuric chloride.

*Dose.*—3 to 12 milligrams ( $\frac{1}{20}$  to  $\frac{1}{5}$  grain).

*NOTES.*—The crystalline masses of arsenious iodide found in commerce are obtained by fusing the elements together; they contain more or less uncombined iodine and arsenium, and consequently dissolve incompletely in water, forming a yellow solution with blackish, insoluble flocks. When recrystallised from carbon bisulphide, toluene or other solvent, the compound dissolves completely in water, forming a colourless, or nearly colourless, solution.

**ASAFETIDA.**

ASAFETIDA.

*Synonym.*—Asafoetida.

Asafetida is a gum-resin obtained from the root of *Ferula fetida*, Regel (N.O. Umbelliferæ), and probably from the roots of other species growing in Eastern Persia and Western Afghanistan. In the cortex of the stem and root are numerous, large, schizogenous ducts, containing a milky emulsion which exudes when the ducts are wounded. The drug is collected by cutting off the stem close to the crown of the root. The juice exudes and hardens, forming the gum-resin, which is then scraped off. The drug is conveyed to Bombay, where it is sorted before being exported to Europe.

The gum-resin occurs either in tears or masses, but the tears are alone official. These are usually flattened, from 12 to 25 millimetres in diameter, and either separate or in more or less compact masses. The colour, which darkens on keeping, varies from pale yellowish-white to dull grey. The tears are tough at ordinary temperatures, but become harder when cooled and softer when warmed. They are opaque and milky white, or yellow and translucent internally; but, when broken, the freshly fractured

surface gradually darkens, becoming first pink and subsequently reddish-brown. The drug has a powerful and persistent, alliaceous odour and a bitter, acrid, alliaceous taste. It forms a white emulsion when triturated with water.

The chief constituents of asafetida are about 62 per cent. of resin, 25 per cent. of gum, and 7 per cent. of volatile oil. The resin consists of asaresinotannol, partly free and partly combined with ferulic acid. The volatile oil contains in the lower boiling fraction two terpenes, one apparently identical with pinene, and from the higher boiling portions the disulphides  $C_7H_{14}S_2$  and  $C_{11}H_{20}S_2$  have been separated. The drug also contains free ferulic acid, water, and small quantities of various impurities. If a small fragment be boiled for a few minutes with strong hydrochloric acid, the liquid—after dilution with an equal volume of water, and filtration—should exhibit a blue fluorescence when dropped into excess of ammonia, the colour being due to umbelliferone produced from the ferulic acid present. Pure tear asafetida should contain from 65 to 75 per cent. of substances soluble in alcohol, and yield about 3 to 5 per cent. of ash, but good commercial qualities of the drug may contain not more than 60 per cent. of substances soluble in alcohol, and yield as much as 10 per cent. of ash.

Asafetida is used as an expectorant in chronic bronchitis, and as a carminative in flatulence. It is employed generally, in hysterical and allied conditions, to produce a subjective effect through its unpleasant smell and taste. The drug is associated with aloes in *Pilula Aloes et Asafetidæ*, and with galbanum and myrrh in *Pilula Galbani Composita*. *Tinctura Asafetidæ* contains the resin and volatile oil, the gum being insoluble in the 70 per cent. alcohol used in its preparation. *Spiritus Ammoniæ Fetidus* is an alcoholic solution of the volatile oil to which ammonia has been added. When it is desirable to cover the taste and odour of asafetida, it should be given in pills. The best excipient is water, and the pills should be coated first with a thin layer of acacia (by moistening with mucilage of acacia and afterwards drying), and then with sandarac in the form of pill varnish. The official pills may be treated in the same way with advantage. Pills containing asafetida should not be silvered, as the sulphuretted oils of the drug turn the silver black. Asafetida is often associated with valerianates in pills. It may also be given in the form of an emulsion; such emulsions keep best in a concentrated form, and can be diluted by the patient. The tincture is frequently given in mixtures, often with tincture of valerian; mucilage of acacia must be added to suspend the resin which separates.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

*NOTES.*—Asafetida should be kept in well-stoppered bottles in a cool place. It cannot be dried and powdered without loss of part of its volatile constituents. The drug may occur in reddish masses (lump asafetida), which however are often very impure, leaving as much as 50 per cent. of ash, or even more. Varieties of asafetida also occur which yield no umbelliferone, but they seldom reach the London market.



**ASPARAGINUM.**

ASPARAGIN.



*Synonyms.*—Althein; Amidosuccinic Acid Amide.

Asparagin,  $\text{NH}_2\text{CHCO}_2\text{HCH}_2\text{CONH}_2, \text{H}_2\text{O}$ , is the amide of aspartic or amidosuccinic acid, and is found in the cell sap of plants in two isomeric forms, lævo- and dextro-asparagin, the former existing in asparagus, beet-root, wheat, and many seeds.

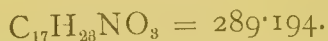
It forms colourless crystals, which are sweet in the case of dextro-asparagin, while lævo-asparagin has a disagreeable and cooling taste. Soluble in water (1 in 50), acids, and alkalies, insoluble in alcohol and ether. The crystals have a slightly acid reaction.

Asparagin is a powerful diuretic and has been given in cardiac dropsy, Bright's disease, and gout. Its solutions dissolve freshly precipitated mercuric oxide, and preparations of mercury amidosuccinamate have been used for hypodermic injection in syphilis.

*Dose.*—6 to 12 centigrams (1 to 2 grains).

**ATROPINA.**

ATROPINE.



Atropine,  $\text{C}_{17}\text{H}_{23}\text{NO}_3$ , may be obtained from the leaves or root of *Atropa Belladonna*, Linn. (N.O. Solanaceæ), but it is more often obtained from the rhizome of *Scopola carniolica*, Jacq. (N.O. Solanaceæ), and it is also found in other Solanaceous plants.

It occurs in colourless acicular crystals, or as a microcrystalline powder. Slightly soluble in water (1 in 500), readily soluble in alcohol (1 in 3), chloroform, and ether. Melting-point, when pure,  $115.5^\circ$ . It should leave no residue on ignition. Commercial atropine frequently contains small amounts of hyoscyamine. This substance lowers the melting-point of the alkaloid and raises that of the aurichloride, a compound which may be prepared by adding gold chloride to a solution of the alkaloid in hydrochloric acid, and, after drying, should have a melting-point of  $137^\circ$ ; hyoscyamine aurichloride melts at  $160^\circ$ . The solution is optically inactive, while a solution of hyoscyamine is optically active.

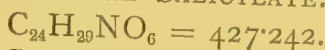
Atropine has a stimulant action on the central nervous system, especially on the motor area; and it depresses, and in large doses paralyzes, the nerve-endings to secretory glands, plain muscle, and the heart. Applied locally to the skin it is used to check excessive perspiration, to stop the secretion of milk, and to depress sensory nerve-endings and so soothe chronic pain. Taken internally it is also employed to arrest the secretions, especially the night-sweats of phthisis, and to a less degree the milk and saliva. It is also employed for its action on the heart in any condition in which there is excessive nervous inhibition, whether this be due to disease or

poisons such as digitalis; in all such conditions atropine accelerates the pulse by paralysing the vagus terminals. In ophthalmic practice it is used to dilate the pupil; when such dilatation is necessary and there is reason to apprehend intra-ocular tension from glaucoma or other cause, homatropine should be employed, as its action is so easily controlled by eserine. In virtue of its depressant effect on nerve-endings to plain muscle, it is employed in various forms of intestinal colic; it is also useful in the reduction of hernias, and is commonly administered with purgatives in order to lessen the griping. In spasmodic contraction of the ureters, bile ducts, or urethra, whether produced by calculi or other causes, atropine is useful. A hypodermic injection of atropine will always abort an attack of spasmodic asthma, and these attacks cannot take place whilst the patient is under the influence of this drug. Atropine is used as a stimulant in conditions of cerebral and medullary depression—for example, in opium and other forms of narcotic poisoning. In whooping-cough and other respiratory troubles it is possible that it acts beneficially by removing spasm rather than by exciting the respiratory centre. The alkaloid is given internally in the form of pills, prepared by triturating it with milk sugar and massing with glucose. It is also used for all preparations of a fatty nature, such as the official ointment and various other ointments, in which it is sometimes prescribed with cocaine or boric acid. A solution in oleic acid and olive oil (1 in 50) forms Oleinum Atropinæ, which is used as a pigment; a solution in castor oil (1 in 100) is employed for instillation into the eyes, and a solution in soft paraffin (1 in 120), made with gentle heat, is also used in ophthalmic work.

*Dose.*— $\frac{1}{3}$  to  $\frac{2}{3}$  milligram ( $\frac{1}{200}$  to  $\frac{1}{100}$  grain).

### ATROPINÆ SALICYLAS.

ATROPINE SALICYLATE.



Atropine salicylate,  $\text{C}_{17}\text{H}_{23}\text{NO}_3 \cdot \text{C}_7\text{H}_6\text{O}_3$ , is the salt of a base obtained from *Atropa Belladonna*, Linn., and other Solanaceous plants.

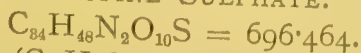
It occurs in colourless crystals, or as a white crystalline powder. Soluble in water (1 in 20), and in alcohol.

Atropine salicylate has been used as a substitute for the sulphate in ophthalmic practice. It is said to produce less stable aqueous solutions than the sulphate, and it is not so soluble.

*Dose.*— $\frac{1}{3}$  to  $\frac{2}{3}$  milligram ( $\frac{1}{200}$  to  $\frac{1}{100}$  grain).

### ATROPINÆ SULPHAS.

ATROPINE SULPHATE.



Atropine sulphate,  $(\text{C}_{17}\text{H}_{23}\text{NO}_3)_2 \cdot \text{H}_2\text{SO}_4$ , is the salt of a base obtained from *Atropa Belladonna*, Linn., and other Solanaceous plants.

It occurs in colourless crystals or as a white microcrystalline powder. Very soluble in water (2 in 1), soluble in alcohol (1 in 4),

insoluble in ether or chloroform. Melting-point,  $185^{\circ}$  to  $186^{\circ}$ . The salt should leave no residue on ignition. By the addition of sodium carbonate to the aqueous solution a white precipitate is obtained which, when separated, responds to the tests of atropine.

Atropine sulphate is employed principally in the preparation of solutions for local application to the eye. The action of atropine is exerted upon the terminations of the nerves in the involuntary muscles of the eye. These are paralysed by its local action, dilatation of the pupil and disturbance of accommodation resulting. Atropine is used in ophthalmic practice to dilate the pupil for ophthalmoscopic examination; to paralyse the movements of the iris and ciliary muscle; to break down adhesions and to prevent the formation of contractions of the iris. It increases intra-ocular tension, and its use is therefore contra-indicated in glaucoma. Atropine is employed by hypodermic injection to relieve pain in sciatica and in ovarian and uterine neuralgia. For its action in diminishing all gland secretions it is employed in the night-sweats of phthisis. Atropine is added to hypodermic injections of morphine to reduce the tendency to depression and to prevent constipation. The sulphate is the salt of atropine most generally employed in making solutions for application to the eyes, for hypodermic injections, and for taking internally in mixtures. The official solution contains a small proportion of salicylic acid, added for preservative purposes. *Lamellæ Atropinæ* are prepared for ophthalmic use. As a substitute for glycerin of belladonna, *Glycerinum Atropinæ* will be found equally efficient and more cleanly. In cases of poisoning by atropine or belladonna, 12 decigrams (20 grains) of tannic acid should be given in 90 to 120 mls (3 or 4 ounces) of water, and then the stomach evacuated by means of a syphon tube or an emetic. Atropine is incompatible with alkalies, tannic acid, and salts of mercury.

*Dose.*— $\frac{1}{3}$  to  $\frac{2}{3}$  milligram ( $\frac{1}{200}$  to  $\frac{1}{100}$  grain).

## AURANTII CORTEX.

### BITTER ORANGE PEEL.

*Synonym.*—*Aurantii Amari Cortex.*

Bitter orange peel consists of the fresh or dried outer portion of the pericarp of the ripe fruit of *Citrus Aurantium*, var. *Bigaradia*, Hook. f. (*Citrus vulgaris*, Risso) (N.O. Rutaceæ). Bitter oranges are cultivated chiefly in the South of Spain (Seville oranges) and in Sicily (Palermo); the fruits are collected before they are quite ripe, the ripening being completed on the voyage to this country. The fresh fruit is distinguished from the sweet orange by its deeper orange-red colour, more rugged surface, bitter peel and sour pulp. For medicinal use the peel should be removed with as little as possible of the white "zest" adhering, but at the same time care should be taken to avoid unnecessarily rupturing the oil-glands, which are situated in considerable number just below the epidermis



of the fruit, since these contain the volatile oil to which the aroma of the peel is due. Fresh bitter orange peel (*Aurantii Cortex Recens*) is best obtained during February and March, as the Spanish fruit is not usually imported until the end of January.

The peel is deep orange-red in colour, with a rough and glandular outer surface. It has an agreeable aromatic odour and bitter taste, due to the presence of a volatile oil and a bitter principle. The dried peel yields about 6 per cent. of ash. Dried bitter orange peel (*Aurantii Cortex Siccatus*) is imported chiefly from Malta, usually in narrow, machine-cut strips (gelatin cut), but owing to the excessive rupturing of the oil-glands it is not equal in aroma to hand-cut English-dried peel. Larger pieces (quarters) are sometimes seen in commerce, but these have much of the white "zest" attached to them. The transverse section moistened with hydrochloric acid assumes a dark green colour, a reaction which is sometimes useful in identifying the drug.

The chief constituent of orange peel is the volatile oil. An amorphous glucosidal bitter principle named *aurantiamarin*, is also present. *Hesperidin*, a colourless, tasteless, crystalline substance, occurs chiefly in the white "zest" of the peel, accompanied by *isohesperidin*.

Orange-peel is a constituent of many pharmacopœial preparations, in all of which it is used as a flavouring agent, and for its bitter stomachic and carminative properties. Its preparations produce a dark colour with ferric chloride.

### AURANTII CORTEX DULCIS.

SWEET ORANGE PEEL.

*Synonym.*—*Aurantii Dulcis Cortex.*

Sweet orange peel consists of the fresh outer portion of the pericarp of the ripe fruit of *Citrus Aurantium*, Linn. (N.O. Rutaceæ).

The peel is orange-yellow in colour, and has a fragrant odour and pungent aromatic taste, due to the volatile oil contained in numerous glands situated just below the epidermis of the fruit.

Sweet orange peel is not used in medicine, but is a source of volatile oil of orange.

### AURANTII CORTEX INDICUS.

INDIAN ORANGE PEEL.

Indian orange peel consists of the fresh or dried outer portion of the pericarp of varieties of *Citrus Aurantium* (N.O. Rutaceæ), grown in India and Ceylon.

This variety of orange peel should possess the pleasant odour and bitter taste characteristic of bitter orange peel from *Citrus Aurantium*, var. *Bigaradia*, and should have very little of the white inner portion of the pericarp adhering to it.

Indian orange peel is sanctioned for use in India and the Eastern Colonies, in making official preparations for which fresh or dried bitter orange peel is directed to be used.

**AURI BROMIDUM.**

GOLD BROMIDE.

*Synonym.*—Gold Tribromide.

Gold bromide,  $\text{AuBr}_3$ , may be obtained by acting on hydro-auric bromide ( $\text{AuHBr}_4$ ) with ether. Hydro-auric bromide is prepared by pouring bromine on pulverulent gold, and when the reaction is over adding a quantity of hydrobromic acid (specific gravity, 1.380) equal in weight to the gold taken and then as much bromine as necessary to dissolve the gold completely. The solution deposits large, flat, needle-shaped crystals of a dark red colour.

Pure gold bromide occurs in brownish, deliquescent, crystalline masses. Soluble in water (1 in 75). It is reduced by sulphurous acid to aurous bromide, and then to metallic gold. Heated to  $115^\circ$  the bromide is transformed into bromine and aurous bromide.

Gold has been employed in medicine for the most varied conditions. It is much less poisonous than most of the other heavy metals, and its salts may be taken for months without any ill effects. On the alimentary canal it exerts the ordinary effects of the metals, and in poisonous doses its astringent properties induce vomiting and diarrhoea. Its principal action is on metabolism, and it is reputed to have the power of facilitating the absorption of pathological connective tissue. It is also employed in inveterate cases of tertiary syphilis and in nervous diseases, especially those of a hysterical nature; in the latter class the cure is thought to be due to suggestion. Gold bromide is employed in epilepsy, and is said to be much more active (five or six times) than other bromides, though it contains only about 50 per cent. of bromine. The salts of gold are commonly given in solution, and usually in association with arsenic (see *Liquor Auri et Arsenii Bromidi*). Gold bromide may be made into pills by rubbing with a little kaolin and massing with kaolin ointment. Some advertised cures for alcoholism have been said to contain a gold salt.

*Dose.*—1 to 12 milligrams ( $\frac{1}{80}$  to  $\frac{1}{5}$  grain).

*NOTES.*—Solutions of gold bromide are less stable than solutions of the chloride. *Auri et Potassii Bromidum* has been introduced as a substitute for gold bromide. The gold and potassium bromide occurs as a blackish or brown, anhydrous, non-deliquescent powder, which is readily soluble in water.

**AURI CHLORIDUM.**

GOLD CHLORIDE.



Gold chloride, or aurochloric acid,  $\text{AuCl}_3\text{HCl}, 4\text{H}_2\text{O}$ , may be obtained by dissolving gold in nitro-hydrochloric acid, adding an excess of hydrochloric acid, and evaporating the solution.

It occurs in yellowish, deliquescent, crystalline masses, which stain the skin violet. Soluble in water and in alcohol. The solutions are very readily reduced by organic matter.

Gold chloride has properties similar to those of gold bromide. It is given in pills compounded with kaolin ointment.

*Dose.*—4 to 16 milligrams ( $\frac{1}{16}$  to  $\frac{1}{4}$  grain).

*NOTES.*—The substance sold in commerce as gold chloride consists usually of sodium auro-chloride,  $\text{NaAuCl}_4 \cdot 2\text{H}_2\text{O}$ , which is yellow and more distinctly crystalline, but has similar properties to gold chloride. It contains 49.4 per cent. of metallic gold. The substances sold as gold and sodium chloride are mixtures of the above with sodium chloride, and contain from 20 to 30 per cent. of gold. *Auri et Sodii Chloridum*, U.S.P., is a mixture of equal parts of anhydrous gold chloride,  $\text{AuCl}_3$ , and anhydrous sodium chloride. It occurs as an orange-yellow, deliquescent powder, the average dose of which is 5 milligrams ( $\frac{1}{10}$  grain). Solution of auric chloride is prepared by dissolving 2 of pure gold leaf in 3 of nitric acid, 12 of hydrochloric acid, and 8 of distilled water, then adding 2 of hydrochloric acid, evaporating till acid vapours cease to be given off, and dissolving the residue in 100 of distilled water.

## AZADIRACHTA INDICA.

INDIAN AZADIRACH.

*Synonyms.*—Neem Bark; Margosa Bark.

Indian azadirach is the dried stem bark of *Melia Azadirachta*, Linn. (N.O. Meliaceæ), a tree indigenous to India, Ceylon, and the Malay Archipelago.

The bark occurs in channelled, tough, and fibrous pieces, attaining as much as 10 millimetres in thickness. Externally it is of a brownish-grey colour, and has a rough, scaly, or fissured surface. Internally it is yellowish, conspicuously laminated, and coarsely fibrous. The transverse section is minutely chequered, pale narrow medullary rays and tangential bands of parenchyma alternating with darker groups of bast-fibres. Under the microscope the latter are seen to be surrounded by lignified parenchymatous cells.

The chief constituents of the bark are a bitter amorphous resin, a crystalline, bitter alkaloid called margosine, margosic acid, a crystalline substance, and tannin.

Indian azadirach is used as a simple bitter, in the same way as gentian or quassia, for which it is employed as an equivalent in India and the Eastern Colonies, being administered usually in the form of tincture or infusion.

## BALNEUM ACIDI BORICI.

BORIC ACID BATH.

Boric Acid	...	...	...	...	1.25 to 3.00
Water, sufficient to produce	...	...	...	...	100.00

For a full-sized bath dissolve 1750 to 4200 grammes (60 to 144 ounces) of boric acid in 140 litres (30 gallons) of water.

This bath is used in skin diseases as an antiseptic.

## BALNEUM ACIDUM.

ACID BATH.

Diluted Nitro-hydrochloric Acid	...	...	...	0.30
Water, sufficient to produce	...	...	...	100.00



For a full-sized bath add 420 grammes (14·5 ounces) of diluted nitro-hydrochloric acid to 140 litres (30 gallons) of water. This bath is used in chronic congestion of the liver.

### BALNEUM ALKALINUM.

#### ALKALINE BATH.

Sodium Carbonate, in crystals	...	...	0·10 to 0·20
Water, sufficient to produce	...	...	100·00

For a full-sized bath dissolve 140 to 280 grammes (5 to 10 ounces) of sodium carbonate in crystals in 140 litres (30 gallons) of water.

This bath is used in skin diseases to remove scaly incrustations, also in gout and rheumatism.

### BALNEUM CALIDUM.

#### HOT BATH.

Water at 37° to 43°, a sufficient quantity.

Use 140 litres (30 gallons) for a full-sized bath. To avoid accidents, place some cold water in the bath first, and add hot water until the thermometer indicates the required temperature.

### BALNEUM EFFERVESCENTS.

#### EFFERVESCENT BATH.

(1) Sodium Bicarbonate	...	...	...	0·30
Sodium Acid Sulphate	...	...	...	0·15
Water, sufficient to produce	...	...	...	100·00

Dissolve the sodium bicarbonate in the water, and add the sodium acid sulphate, in lumps or cakes, to the solution. For a full-sized bath use 140 litres (30 gallons) of water containing 420 grammes (15 ounces) of sodium bicarbonate, and 210 grammes (7·5 ounces) of sodium acid sulphate.

(2) Sodium Bicarbonate	...	...	...	0·30
Sodium Acid Sulphate	...	...	...	0·15
Sodium Chloride	...	...	...	1·00
Calcium Chloride	...	...	...	0·15
Water, sufficient to produce	...	...	...	100·00

Dissolve the sodium bicarbonate and the chlorides in the water then add the sodium acid sulphate. For a full-sized bath use 140 litres (30 gallons) of water containing 420 grammes (15 ounces) of sodium bicarbonate, 1400 grammes (50 ounces) of sodium chloride, and 210 grammes (7·5 ounces) of calcium chloride and sodium acid sulphate.

These baths are used in the Nauheim treatment of heart disease. Contact between the patient's skin and the sodium acid sulphate should be prevented by placing sheets of lead foil over the salt, and it is also advisable to prevent direct contact of the sulphate with the bath unless it be made of porcelain or coated with a genuine vitreous enamel. Lead foil and enamelled soap-dishes are suitable holders for the sulphate.

**BALNEUM FRIGIDUM.**

## COLD BATH.

Cold water at 15°, a sufficient quantity.

Use 140 litres (30 gallons) for a full-sized bath. The temperature of the water may be reduced, if desired, by the addition of ice.

**BALNEUM SINAPIS.**

## MUSTARD BATH.

Mustard	...	...	...	...	0.25 to 0.50
Water, sufficient to produce	...	...	...	...	100.00

Rub the mustard to a smooth paste with cold water before adding it to the hot water, and use 140 litres (30 gallons) of water containing 350 to 700 grammes (12 to 24 ounces) of mustard for a full-sized bath. If used for a child, give the bath until the arms of the person holding the child begin to tingle.

This bath is used in chills and febrile conditions.

**BALNEUM SODII CHLORIDI.**

## SALT BATH.

Sodium Chloride or Sea Salt	...	...	2.50 to 5.00
Water, sufficient to produce	...	...	100.00

For a full-sized bath use 140 litres (30 gallons) of water containing 3500 to 7000 grammes (124 to 248 ounces) of sodium chloride or sea salt.

This bath is used in gout and rheumatism.

**BALNEUM SULPHURATUM.**

## SULPHURATED BATH.

Sulphurated Potash	...	...	0.08 to 0.15
Water, sufficient to produce	...	...	100.00

For a full-sized bath dissolve 110 to 210 grammes (4 to 7½ ounces) sulphurated potash in 140 litres (30 gallons) of water.

This bath is used as a parasiticide in scabies and other skin diseases.

**BALNEUM TEPIDUM.**

## TEPID BATH.

Water at 30° to 35°, a sufficient quantity.

For a full-sized bath use 140 litres (30 gallons) of water at the specified temperature.

**BALNEUM VAPORIS CREOSOTI.**

## CREOSOTE VAPOUR BATH.

Creosote, a sufficient quantity.

Heat 30 to 120 mls of creosote in a porcelain or metal dish, over a lamp in a well-closed apartment, continuing the application

of heat until the creosote vapour in the atmosphere has reached the desired concentration. Care should be taken to avoid over-heating the dish employed, as the vapour is inflammable at high temperatures.

This bath is used for antiseptic purposes, especially in whooping-cough.

## BALSAMUM PERUVIANUM.

### BALSAM OF PERU.

Balsam of Peru is an oleo-resinous liquid obtained from the trunk of *Myroxylon Perciræ*, Klotzsch. (N.O. Leguminosæ), a tree growing in the forests of San Salvador in Central America. The formation of the balsam, which is not a normal secretion of the tree, is induced by gently beating the bark, and subsequently scorching it. As the balsam is exuded it is soaked up by rags, with which the wounded places are covered; these are pressed, and the crude balsam so obtained purified by boiling with water. The drug is exported chiefly from Acajutla and Belize to New York and Hamburg.

It occurs as a dark brown, viscid, but not glutinous, liquid, which is transparent and of a reddish-brown colour in thin layers. It has an agreeable balsamic odour and bitter acrid taste with persistent after-taste. It is entirely soluble in absolute alcohol (1 in 1), chloroform, and glacial acetic acid, but only partially soluble in ether. Water shaken with the balsam appears to remove only traces of cinnamic acid. The specific gravity of genuine balsams of good quality varies from 1.140 to 1.153 (about 1.140 to 1.150 at 25°). The commoner adulterants, such as alcohol, kerosene, fixed oil, turpentine, copaiba, etc., lower the specific gravity perceptibly.

This balsam consists essentially of about 65 per cent. of a colourless aromatic oily liquid mixed with about 30 per cent. of a dark resin. The liquid portion is a mixture of benzyl cinnamate and benzyl benzoate in varying proportions, the former usually preponderating; the resin consists of a resin alcohol (peruresinotannol), combined with cinnamic and a little benzoic acid. The drug contains in addition an alcohol (peruvicol) which possesses a sweet odour and taste, together with vanillin and a little free cinnamic acid. The proportion of benzyl cinnamate and benzoate present should be at least 56 per cent., and may be determined by mixing 3 grammes of the balsam with 30 mls of solution of sodium hydroxide (5 per cent.) and shaking for a few minutes with 60 grammes of purified ether. Transfer 51.5 grammes of the ether solution to a flask and evaporate to dryness. The residue, when dried to constant weight by a gentle heat, should weigh not less than 1.4 grammes.

Balsam of Peru is used internally as an antiseptic and expectorant; applied externally it acts as an antiseptic and parasiticide, especially in scabies. It was at one time much used in phthisis, on the supposition that it induced cicatrization of the tuberculous nodules, but it has no such effect. Its action resembles that of benzoic acid. For internal administration it may be prepared either in a mixture



or in pills. An emulsion is made with the aid of an equal weight of powdered gum acacia in the same manner as with a fixed oil, or the emulsion may be made with yolk of egg. When required in pills it may be combined with a little calcined magnesia or slaked lime, and allowed to stand for two or three hours before rolling the mass; or, if the quantity of the drug is small, it may be mixed with powdered liquorice root and a little treacle. For external use it is applied as an ointment (10 per cent.) in combination with lard, resin ointment, zinc ointment, or soft paraffin. For suppositories the basis should be theobroma oil, with a sufficiency of white wax to counteract the softening effect of the balsam; the balsam should be first mixed with a portion of the melted basis upon a slab before adding to the bulk of the fat. It is sometimes applied in skin diseases in the pure state, or mixed with an equal quantity of castor oil.

*Dose.*—3 to 10 decimils (5 to 15 minims).

NOTES.—Genuine balsam of Peru may be distinguished from factitious or so called synthetical balsam by the following test:—Shake 2 grammes of the balsam with 10 mils of petroleum spirit, evaporate the spirituous solution in an absolutely clean porcelain dish, dry on a water-bath, cool, and mix with 2·5 decimils of nitric acid (specific gravity, 1·38). Genuine balsam will give a golden-yellow colour.

## BALSAMUM TOLUTANUM.

### BALSAM OF TOLU.

Balsam of tolu is obtained from the trunk of *Myroxylon toluifera*, H. B. and K. (N.O. Leguminosæ), a tree indigenous to New Granada. The balsam exudes from incisions made in the trunk, and is collected in gourds, being afterwards transferred to skins, and finally exported in tins.

Balsam of tolu is imported as a soft, tenacious, resinous substance, which becomes harder on keeping, and is quite brittle in cold weather. A small piece warmed and pressed between two pieces of glass forms a transparent yellowish-brown film which exhibits numerous crystals of cinnamic acid when examined under the microscope. The drug has a fragrant odour, and an aromatic, slightly acid taste. It is soluble in alcohol (1 in 1), benzol (1 in 3), chloroform (2 in 1), and glacial acetic acid (1 in 1), but is insoluble in petroleum spirit, and only partially soluble in carbon bisulphide, the portion dissolved in this solvent consisting chiefly of cinnamic acid. The alcoholic solution has an acid reaction. If 5 grammes be gently warmed with two successive portions of 25 and 10 mils of carbon bisulphide, and the mixed solutions evaporated, the crystalline residue of benzoates and cinnamates left should require not less than one-third of its weight of potassium hydroxide for saponification.

The chief constituents of balsam of tolu are 12 to 15 per cent. of free cinnamic acid, 0·05 per cent. of vanillin, and 7·5 per cent. of an oily liquid, consisting of benzyl benzoate mixed with a little benzyl

cinnamate. The resin, of which the balsam contains about 80 per cent., yields on saponification an alcohol (toluresinotannol) and cinnamic acid, together with a little benzoic acid. Good fresh balsam of tolu yields, when distilled with water, about 1·4 per cent. of a very fragrant volatile oil.

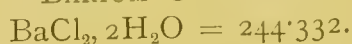
The properties of balsam of tolu are similar to those of balsam of Peru, but the former is not used externally. The official preparations of balsam of tolu are Syrupus Tolutanus and Tinctura Tolutana. These preparations are used principally in cases in which the mucus is tenacious and removed with difficulty by coughing. The syrup is prepared by dissolving sugar in a saturated aqueous decoction of the drug, but a better preparation can be obtained by first dissolving the balsam in alcohol. The tincture is made with strong alcohol, and therefore contains the resin; it is used in the preparation of the tolu lozenge basis. The syrup, besides being used in cough mixtures on account of its expectorant and antiseptic properties, is sometimes employed as a flavouring agent; elixirs may, however, be preferred for the latter purpose.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

NOTES.—Balsam of tolu has sometimes been adulterated with exhausted balsam and colophony resin. The former may be detected by the amount soluble in carbon bisulphide, which should not fall below 25 per cent.; the latter by the crystalline nature and saponification number of the residue left on evaporating the solution. The carbon bisulphide residue dissolved in a little glacial acetic acid should not be coloured green by sulphuric acid.

## BARII CHLORIDUM.

BARIUM CHLORIDE.



Barium chloride,  $\text{BaCl}_2, 2\text{H}_2\text{O}$ , may be prepared by dissolving barium carbonate in diluted hydrochloric acid, filtering the solution thus obtained, and evaporating to crystallisation; on the large scale it is prepared from "witherite," a native carbonate.

It occurs in the form of colourless trimetric plates or glistening scales, odourless, non-efflorescent, and having an unpleasant, bitter, sharp, saline taste. Soluble in water (1 in  $2\frac{1}{2}$ ), but insoluble in alcohol, and soluble with difficulty in hydrochloric acid. The aqueous solution is neutral; a concentrated aqueous solution is precipitated by strong hydrochloric acid. The chloride loses its water of crystallisation at  $100^\circ$ , but takes it up again in moist air. Diluted alcohol, after remaining in contact with the salt for several hours, should, on ignition, give a pure yellowish-green flame free from red (absence of traces of strontium). An aqueous solution of barium chloride should not be precipitated by ammonium sulphide, nor should any residue remain after adding excess of diluted sulphuric acid to the solution, filtering, and evaporating to dryness.

Barium chloride has a very remarkable stimulant action on all forms of muscle-tissue. It increases the tonus of heart-muscle

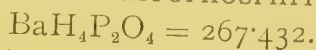
without materially affecting the rate, and it increases both the tonus and automatic movement of all forms of involuntary muscle. Thus it raises blood-pressure by constricting the vessels and tends to empty the intestines, bladder, and gall bladder. It is a very powerful drug, and very apt to cause poisoning, which shows itself by gastrointestinal symptoms and a great rise in blood pressure. Its indications in disease are not well defined, but it is by far the most powerful "tonic," using that term in the true sense. It may be given in the form of solution, but is incompatible with sulphates, phosphates, and carbonates.

*Dose.*—15 to 120 milligrams ( $\frac{1}{4}$  to 2 grains).

*NOTES.*—Solution of barium chloride is prepared by dissolving 10 of the salt in sufficient distilled water to produce 100. This is employed as a test solution, as is also solution of barium hydroxide, which is prepared by dissolving 5 of the hydroxide in sufficient recently boiled distilled water to produce 100.

## BARII HYPOPHOSPHIS.

BARIUM HYPOPHOSPHITE.



Barium hypophosphite,  $\text{Ba}(\text{H}_2\text{PO}_2)_2$ , may be obtained by the interaction of barium hydroxide, phosphorus, and water.

It occurs in white crystals. Soluble in water (1 in  $3\frac{1}{2}$ ). When heated, hydrogen phosphide is evolved, and it is converted into phosphate. It should be free from lead, copper, arsenium, iron, aluminium, calcium, magnesium, sodium, and potassium and contain not more than traces of chlorides.

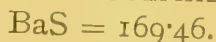
Barium hypophosphite has the general properties of the hypophosphites, in association with the tonic action of barium.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTE.*—Commercial samples of barium hypophosphite generally contain appreciable quantities of lime.

## BARII SULPHIDUM.

BARIUM SULPHIDE.



Barium sulphide,  $\text{BaS}$ , may be obtained by igniting a mixture of barium sulphate and carbon.

It occurs as a hygroscopic yellowish powder. Soluble in water with decomposition, yielding barium hydroxide and hydrosulphide. In moist air, it becomes converted into barium carbonate and thiosulphate, sulphuretted hydrogen being evolved. On ignition in air, it is converted into barium sulphate. It should contain not less than 60 per cent. of barium sulphide. This may be determined by cautiously adding a solution to excess of an acid solution of ferric sulphate, and titrating the ferrous sulphate formed with permanganate solution.

Barium sulphide is employed as a depilatory, being usually mixed with an equal weight, or twice its weight, of starch powder, or a mixture of starch powder and zinc oxide, with or without powdered



soap; the mixed powder should be kept quite dry, and mixed with water sufficient to form a thin paste immediately before application; after five or ten minutes the application is scraped off, and the part washed with warm water. The skin is reddened, temporarily, by this treatment. For internal use the sulphide should be given in pills coated with keratin or well varnished. They should be prepared by triturating the barium salt with sugar of milk and massing with a minimum of glycerin of tragacanth. Aqueous excipients and acid extracts should not be employed, as they liberate sulphuretted hydrogen.

*Dose.*—3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

*NOTE.*—Barium sulphide should be kept in well-stoppered bottles.

### BEBEERU CORTEX.

BEBEERU BARK.

*Synonyms.*—Nectandræ Cortex; Nectandra Bark; Bibiru Bark; Greenheart Bark.

Bebeeru bark is obtained from the greenheart tree, *Nectandra Rodiaei*, Hook. (N.O. Laurineæ), a native of British Guiana.

The bark occurs in flat heavy pieces 10 to 12 centimetres long, 5 to 7.5 centimetres wide, and 3 to 9 millimetres thick. It is of a greyish-brown colour, the outer surface being marked with broad shallow depressions, due to the exfoliation of the bark. The greyish-brown cork is easily scraped off and discloses a darker brown inner portion. The inner surface of the bark is of a dark cinnamon-brown colour, with broad shallow longitudinal depressions. The bark breaks with a short, granular fracture, the smoothed transverse section exhibiting a narrow pale-grey cork, and a cortex traversed by yellow, wavy, medullary rays, between which small groups of sclerenchymatous cells are arranged radially. The bark has a bitter taste, but is without odour.

The chief constituents of bebeeru bark are the alkaloids beberine and siperine. Beberine is a colourless crystalline alkaloid also found in pareira root. Siperine has been obtained in the form of dark reddish-brown scales of very doubtful purity.

Bebeeru bark is very rarely given in powder. The so-called "beberine sulphate," which is a mixture of alkaloidal sulphates, is the preparation usually employed.

*Dose.*—1 to 4 grammes (15 to 60 grains).

### BEBERINÆ SULPHAS

BEBERINE SULPHATE.

*Synonym.*—Beberine Sulphate.

Beberine sulphate is prepared from commercial beberine—the mixed alkaloids of the bark of *Nectandra Rodiaei*—by dissolving it in alcohol, neutralising the solution with dilute sulphuric acid, evaporating the liquid on a water-bath to a syrupy consistence, spreading this on glass plates, and scaling.

It occurs in brown translucent scales with a very bitter taste, and contains about 30 per cent. of beberine ( $C_{19}H_{21}NO_3$ ), associated with other alkaloids and much colouring matter. Soluble in water (about 1 in 1), sparingly soluble in alcohol, and freely soluble in diluted mineral acids.

Beberine sulphate is an aromatic bitter tonic, and is used as a substitute for quinine. It is given in solution in water, usually with a mineral acid, or in pills massed with syrup of glucose. In dissolving beberine sulphate it should simply be added to warm water.

*Dose*.— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

## BELÆ FRUCTUS.

BAEL FRUIT.

*Synonym*.—Indian Bael.

Bael fruit is the product of *Ægle Marmelos*, Correa (N.O. Rutaceæ), a tree indigenous to India. The half-ripe fruit is collected from cultivated trees, and the pulp used while fresh; or, the fruit is dried and exported entire, or in transverse slices or quarters.

The fruit is readily recognised by the polished surface of the rind, by the hairy seeds which should not be fully developed, and by the reddish pulp which adheres firmly to the rind. The fruit is a spherical or ovoid berry from 7 to 10 centimetres in diameter. Externally it has a yellowish-brown, smooth, or slightly granular hard rind, bearing a circular scar at the point of attachment of the peduncle. When the fruit is cut transversely the rind appears reddish, and is seen to enclose from ten to fifteen carpels, each containing several hairy seeds embedded in a transparent pale-reddish pulp, which usually adheres to the rind. The pulp becomes very hard on drying.

The chief constituents of bael fruit appear to be the mucilage and pectin contained in the pulp of the unripe fruits. Ripe fruits differ from the unripe in yielding the tannin reaction with ferric chloride, and also in possessing a distinct aroma.

Fresh half-ripe bael fruit is mildly astringent and is used in India in cases of dysentery and diarrhoea. The pulp may be eaten, or a decoction made in the proportion of one part to ten of water, slowly boiled down to one-fourth. The liquid extract is much superior to the extract of the dried fruit, which was formerly used.

*NOTE*.—The dried fruit was formerly official, and the fresh half-ripe fruit from cultivated trees is now used in India and the Eastern Colonies.

## BELLADONNÆ FOLIA.

BELLADONNA LEAVES.

Belladonna leaves are obtained from the deadly nightshade, *Atropa Belladonna*, Linn. (N.O. Solanaceæ), a tall branching herb, widely distributed over Central and Southern Europe, and cultivated

in England. The leaves and young branches are collected when the plant is in full flower, and used while fresh.

Belladonna leaves are from 8 to 20 centimetres long, broadly ovate in outline, acute and entire, tapering towards the base. They are generally quite glabrous, but hairs may be found on young leaves. The flowers, which are solitary and pendulous, have bell-shaped gamopetalous corollas of a livid purple colour. The dried leaves exhibit under the lens minute whitish prominences, but are best identified by their histological features; they have a bitterish taste, but are almost inodorous. The epidermal cells of belladonna leaves are large and possess wavy walls and a striated cuticle; in the interneural mesophyll large cells filled with minute sandy crystals of calcium oxalate occur; the transverse section of the midrib exhibits bicollateral bundles devoid of sclerenchymatous fibres. Hairs when present are either long, simple and three or four celled, or they are short and glandular. Stomata occur on both surfaces of the leaf.

The chief constituents of belladonna leaves are the alkaloids atropine and hyoscyamine, the total quantity present in leaves of good quality being about 0.4 per cent., the greater part of which is hyoscyamine.

The medicinal value of belladonna leaves is due to the hyoscyamine and atropine they contain. It is possible that the drug contains minute quantities of other alkaloids (belladonnine, etc.), but not in sufficient quantity to contribute to their physiological action. The leaves are used principally in the form of the green extract, and in mixtures in the form of the juice. The extract is essentially the fresh juice evaporated to the consistence of a soft extract, whereas the unaltered juice is preserved by the addition of alcohol. Several unofficial preparations are in common use. Collodium Belladonnæ is standardised, and used as a liquid plaster, but Collodium Atropinæ is a cleaner preparation, and may with advantage be prescribed instead. Occasionally the leaves are employed as an ingredient of cigarettes for spasmodic asthma.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

NOTES.—Some of the dried belladonna leaves of commerce are of English origin, but much is imported from Germany. It should be of good colour and free from excess of stalk. The leaves of *Phytolacca decandra*, Linn. (N.O. Phytolaccaceæ), and of *Scopola carniolica*, Jacq. (N.O. Solanaceæ), have recently been substituted for belladonna leaves. They are best distinguished by their histological features. *Phytolacca* leaves contain raphides instead of sandy calcium oxalate, whilst *scopola* leaves possess stomata on their under surface only, and the cells with sandy calcium oxalate are much rarer than they are in belladonna leaves.

## BELLADONNÆ RADIX.

### BELLADONNA ROOT.

Belladonna root is obtained from *Atropa Belladonna*, Linn. (N.O. Solanaceæ), a tall branching herb widely distributed over Central



and Southern Europe. The root is collected in the autumn when about three or four years old, cut into pieces, and carefully dried.

Belladonna root occurs usually in cylindrical pieces about 10 to 30 centimetres long, and 1 to 2 centimetres thick. It is covered with a thin greyish-brown wrinkled cork, and breaks with a short fracture, exhibiting a white starchy interior. On the transverse section the cambium is readily discernible as a dark line, within and near to which are scattered groups of vessels. The cortex is firmly adherent to the wood, and devoid of fibres. The root is often crowned with the remains of large hollow aërial stems, and near these the transverse section exhibits one or more circles of well-developed radiate wood. The odour resembles that of liquorice root, but the taste is bitter. A transverse section of belladonna root exhibits under the microscope a wood and cortex chiefly composed of parenchymatous cells filled with starch grains, and occasionally with sandy calcium oxalate. In the wood there are numerous groups of large pitted vessels associated with tracheids and fibres, but the cortex is devoid of bast-fibres. The starch grains range mostly from  $5\mu$  to  $20\mu$  in length; the simple ones are rounded or oval, but many are compound and consist of two, three, or four constituent grains. These characters are sufficient to identify the entire or crushed root, and to limit the drug to young root collected in the late autumn, when it is said to be richest in alkaloid.

The chief constituents of belladonna root are the alkaloids hyoscyamine and atropine. Hyoscyamine exists in the larger proportion; indeed, it appears doubtful whether the crude drug contains atropine at all, it being probable that in the process of extraction part of the hyoscyamine is converted into the isomeric atropine. Traces of scopolamine are also said to be present, as well as a crystalline fluorescent principle,  $\beta$ -methyl-æsculetin. The total amount of alkaloid in the root varies from 0.25 to 0.7 per cent., rarely rising to 1 per cent., wild plants yielding more than cultivated, and young roots more than old.

The medicinal properties of belladonna root depend upon the presence of hyoscyamine and atropine. The root is the basis of the principal pharmaceutical preparations of belladonna. A standardised liquid extract is prepared, from which the official plaster, alcoholic extract, liniment, suppository, tincture, and ointment are made; these all contain a definite proportion of total alkaloid. A chloroformic solution of the root alkaloids is prepared under the name of *Chloroformum Belladonnæ*, and is suitable for mixing with olive oil or camphor liniment. In cases of poisoning by belladonna, emetics should be given or the stomach pump used; stimulants and strong coffee should also be given, and artificial respiration applied if necessary.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTES.*—The substitution of poke root (*Phytolacca decandra*, Linn.) for belladonna may be detected by the transverse section, which exhibits several concentric rings of wood bundles and calcium oxalate in the form of acicular, not

sandy, crystals. *Scopola* rhizome (*Scopola carniolica*, Jacq.) is horizontal or oblique, and bears on the upper surface numerous scars of aerial stems. It is occasionally found in belladonna root, and contains the same alkaloids, but in rather larger proportion, viz., about 0.6 per cent.

## BENZALDEHYDUM.

BENZALDEHYDE.



Benzaldehyde,  $\text{C}_6\text{H}_5\text{COH}$ , may be obtained by heating benzyl chloride with lead nitrate solution.

It occurs as a colourless aromatic liquid with an odour of bitter almonds. Boiling-point,  $179^\circ$ . Specific gravity, 1.050 (about 1.045 at  $25^\circ$ ). The liquid is strongly refractive. Slightly soluble in water (1 in 300), readily soluble in alcohol, ether, and oils. On exposure to the air it oxidises to benzoic acid. It should be free from hydrocyanic acid and chlorinated products.

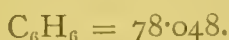
Benzaldehyde is used as a flavouring agent, and is sometimes sold as artificial or synthetic oil of bitter almonds, being the chief constituent of the natural oil (see *Oleum Amygdalæ Amaræ*).

*Dose*.— $\frac{1}{4}$  decimil ( $\frac{1}{2}$  minim).

NOTE.—Benzaldehyde should be kept in small closely stoppered bottles.

## BENZENUM.

BENZENE.



*Synonym*.—Crystallisable Benzol.

Benzene,  $\text{C}_6\text{H}_6$ , is a hydrocarbon obtained by the fractional distillation of the light oil of coal tar.

It is a colourless mobile liquid, free from opalescence, with a characteristic coal-gas odour. Insoluble in water, but miscible with alcohol, ether, acetone, and glacial acetic acid. Boiling-point,  $80^\circ$  to  $81^\circ$ ; solidifies at  $5^\circ$ . Specific gravity, 0.883 to 0.885 (about 0.871 at  $25^\circ$ ). The liquid is very inflammable and burns with a luminous smoky flame. If 4 or 5 drops of phenylhydrazine be added to 10 mils and the liquid allowed to stand for an hour, with frequent shaking, no precipitate should be produced (absence of carbon bisulphide).

Benzene is oxidised in the body to phenol and dioxybenzols, which are excreted in combination with sulphuric and glycuronic acids. Benzene has been given internally for whooping-cough and influenza, in capsules, or as an emulsion, the drug being mixed with a fatty oil and emulsified with gum acacia. Sometimes it is used as an application for the destruction of parasites; in such cases it may be employed in its pure state, or mixed with ten times its volume of a solution of soap. Cruder forms of benzene (see Benzol) are much used for cleaning purposes, on account of the powerful solvent action of the liquid.

*Dose*.—3 to 6 decimils (5 to 10 minims).

NOTES.—Commercial benzene usually contains small quantities of thiophen, which gives a brown colouration when shaken with sulphuric acid. The thiophen may be removed by shaking the benzene with several small successive quantities of sulphuric acid, washing and rectifying the product; it is then sold as "thiophen-free." Benzene must be distinguished from benzol, a mixture of aromatic hydrocarbons, and from benzin, one of the many commercial forms of petroleum spirit, consisting chiefly of the aliphatic hydrocarbons hexane and heptane.

## BENZINUM.

### BENZIN.

*Synonyms.*—Petroleum Benzin; Petroleum Spirit;  
Petroleum Ether; Light Petroleum.

Benzin is a distillate from the lower boiling fractions of American petroleum, or of shale oil, and consists of a complex mixture of hydrocarbons of the general composition  $C_nH_{2n+2}$ .

It is a light, colourless, non-fluorescent, volatile liquid, of a peculiar but not unpleasant odour. It is very inflammable, and its vapour when mixed with air is explosive. It evaporates without leaving any residue. Specific gravity, 0.640 to 0.670 (about 0.638 to 0.660 at 25°). Boiling-point, 45° to 60°. Soluble in alcohol (about 1 in 6), readily soluble in the fixed oils (excepting castor oil), volatile oils, chloroform, ether, and benzene. If 2½ decimils be added to a mixture of 20 decimils of sulphuric acid and 5 decimils of nitric acid, in a test-tube, the liquid warmed for about ten minutes, set aside for half an hour, and then diluted with water, no odour of nitro-benzene should be evolved (absence of benzene). When shaken with warm water the latter should remain neutral.

Benzin has been used in certain skin affections, for removing grease from the skin, but it is chiefly used as a solvent and for cleaning purposes. It is also employed to heat small cauteries.

NOTES.—Benzin can be obtained of any desired boiling-point, up to 120°. Petroleum benzin must be carefully distinguished from benzene, which is a coal-tar product having the formula  $C_6H_6$ , and from benzol.

## BENZINUM PURIFICATUM.

### PURIFIED BENZIN.

*Synonym.*—Purified Petroleum Benzin.

Benzin	...	...	...	...	...	100.00
Potassium Permanganate	...	...	...	...	...	1.00
Sodium Hydroxide	...	...	...	...	...	0.20
Sulphuric Acid	...	...	...	...	...	6.00
Distilled Water, a sufficient quantity.						

Mix the acid with 55 of distilled water, and when cold pour into a bottle capable of holding 200. Add 0.8 of potassium permanganate; when dissolved, add the benzin in four portions, shaking after each addition, and set aside for twenty-four hours with frequent



agitation; decant, add the sodium hydroxide and 0.2 of potassium permanganate dissolved in 24 of distilled water, agitate frequently during several hours, again decant, wash with water and separate the purified petroleum benzin.

It is a colourless transparent liquid with a faint petroleum-like odour. If 10 mls be evaporated from a clean filter paper, no greasy stain nor disagreeable odour should remain (absence of heavy hydrocarbons). Purified benzin should answer to the tests described under Benzinum.

## BENZOINUM.

### BENZOIN.

Benzoin is a balsamic resin obtained from *Styrax Benzoin*, Dryander, and probably other species of *Styrax* (N.O. Styracæ), trees that are indigenous to Siam, Sumatra, and Java. Normally the trees do not produce benzoin, or any substance analogous to it, but the infliction of a wound sufficiently severe to injure the cambium results in the formation of numerous oleo-resin ducts, in which the secretion is produced. It is, therefore, a pathological product. The trunk of the tree is usually hacked with an axe, and after a time the liquid benzoin either accumulates beneath the bark or exudes from the incisions. After the exudation has sufficiently hardened, it is collected and exported, either in the form of loose pieces (tears), or in masses packed in oblong boxes or in tins. Several commercial varieties of benzoin are known, of which Siam and Sumatra are the most important.

Siam benzoin is collected in the Siamese province of Luang Prabang, but the tree which yields it has not yet been identified. It is sent into the market either as tears or masses. The tears are flattened or curved, and attain as much as 5 centimetres in length, and 12 millimetres in thickness; externally they are reddish-yellow, but internally milky-white. Lump or block Siam benzoin consists of tears, cemented together with a comparatively large proportion of transparent reddish-brown resin. Both varieties are characterised by their agreeable odour, recalling vanilla, and by the fact that they contain benzoic acid, but not cinnamic acid.

Sumatra benzoin is obtained from *S. Benzoin* on the island of Sumatra. It is always exported in blocks, which, like the Siam variety, consist of white tears, compacted together by a resin, but the latter is usually less vitreous in appearance, and of a dull reddish or greyish-brown colour. Fine qualities have a strong storax-like odour, which is quite distinct from the vanilla odour of Siam benzoin. Sumatra benzoin may also be distinguished from Siam by the presence in it of cinnamic acid, which may be detected by boiling a little of the powdered resin with potassium permanganate, when an odour of benzaldehyde will be developed.

Siam benzoin consists mainly of benzoic acid (up to 38 per cent.), partly free, partly combined with benzoiresinol and sia-resinotannol;

it also contains vanillin (about 0·15 per cent.), and an oily liquid, probably an ester of benzoic acid (0·3 per cent.). When quite pure it should be entirely soluble in alcohol, and yield traces only of ash. Good commercial Siam benzoin should yield not more than 3 per cent. of matter insoluble in alcohol, or more than 1 per cent. of ash when incinerated. Sumatra benzoin consists of benzoic and cinnamic acids (up to 30 per cent.), both free and combined with benzoeresinol and sumaresinotannol; it also contains vanillin, as well as traces of styrol, phenyl-propyl cinnamate, benzaldehyde, etc., all of which combine to produce its characteristic odour. It is liable to be much adulterated with vegetable debris and mineral matter, and should not yield more than 10 per cent. insoluble in alcohol, or more than 2 per cent. of ash.

Benzoin has the same action as its constituents, benzoic acid, cinnamic acid, and resin. It is used externally, in the form of tincture, as a mild stimulant and antiseptic. If it be taken by the mouth, it acts as a carminative; it is rapidly absorbed, and, during excretion, acts as a mild expectorant, diuretic, and urinary antiseptic. Benzoin is a preservative of fats otherwise liable to become rancid, and is therefore used in the preparation of Adeps Benzoatus.

NOTES.—Some samples of Sumatra benzoin are distinguished by their greyish, vitreous, or glassy appearance, and absence of any perceptible aromatic odour; these are classed as "Penang," or "Glassy Penang" benzoin, and are not suitable for pharmaceutical use. Palembang benzoin is another variety obtained from Sumatra, but from what tree is not definitely known. The drug arrives usually in tins, and consists of a reddish resinous mass, in which a few scattered tears are embedded. It has only a slight odour, resembling that of Sumatra benzoin, and, like the glassy Penang variety, is used chiefly for the production of benzoic acid.

## BENZOL.

### BENZOL.

*Synonyms.*—Rectified Benzol; Benzol (90 per cent.).

Benzol is a mixture of aromatic hydrocarbons obtained from light coal-tar oil, and contains about 70 per cent. of benzene,  $C_6H_6$ , together with 20 to 30 per cent. of toluene,  $C_6H_5CH_3$ .

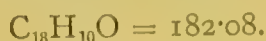
It occurs as a colourless, not opalescent, mobile liquid, with a strong characteristic odour. Specific gravity, 0·880 to 0·888. Distillation should commence at about 80°, and 90 per cent. of the benzol should pass over below 100°, while it should distil completely below 120°.

Pure benzene (crystallisable benzol) is more suitable for internal administration than benzol, which is used chiefly as a solvent, and for cleaning purposes.

NOTES.—There are various grades of benzol in commerce, designated according to the amount of distillate obtainable under 100°, the percentage referring to this fact, and not to the amount of any particular constituent. Thus, liquids described as 90 per cent. benzol, 50 per cent. benzol, and 30 per cent. benzol, are mixtures of benzene with hydrocarbons of higher boiling-point, and the percentage indicates the proportion that will distil below 100°.

**BENZOPHENONUM.**

BENZOPHENONE.

*Synonym.*—Diphenyl Ketone.

Benzophenone,  $(\text{C}_6\text{H}_5)_2\text{CO}$ , may be obtained by distilling calcium benzoate, or by the action of carbonyl chloride on benzene in the presence of aluminium chloride. An isomeride of benzophenone is formed on oxidising diphenyl-methane, but it readily changes into ordinary benzophenone.

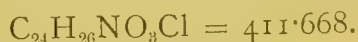
It occurs in white rhombic crystals of pronounced aromatic odour. Insoluble in water, readily soluble in alcohol and ether. Melting-point,  $48^\circ$ ; boiling-point,  $306^\circ$ .

Benzophenone possesses hypnotic properties, and is the typical aromatic ketone used in experimental comparisons of different groups of hypnotics.

*Dose.*—2 to 5 decigrams (3 to 8 grains).

**BENZYL MORPHINÆ HYDROCHLORIDUM.**

BENZYL MORPHINE HYDROCHLORIDE.

*Synonym.*—Benzylmorphine.

Benzylmorphine hydrochloride,  $\text{C}_{17}\text{H}_{18}\text{NO}_3(\text{C}_6\text{H}_5\text{CH}_2)\text{HCl}$ , is a salt of a base formed by the action of benzyl chloride on morphine, in the presence of an alkali and alcohol or other diluent.

It occurs as a colourless micro-crystalline powder having a bitter taste. Soluble in water (1 in 200) and in alcohol (1 in 160), more readily when warmed; insoluble in ether and in chloroform. On the addition of a small quantity to a mixture of 3 mls of strong sulphuric acid and 1 decimil of formaldehyde solution in a porcelain dish, benzylmorphine gives a permanent reddish-violet colour. Under the same conditions morphine gives at first a purple-red colour, passing through violet to almost pure blue; ethylmorphine gives a deep blue colour.

Benzylmorphine has properties closely resembling those of acetomorphine, and is used as a substitute for morphine and codeine in respiratory affections. The hydrochloride may be given in solution with expectorants, or in the form of pills.

*Dose.*—8 to 30 milligrams ( $\frac{1}{8}$  to  $\frac{1}{2}$  grain).

NOTES. —Benzylmorphine hydrochloride is also known under the trade-name Peronin; the base must not be confused with benzoyl-morphine, which is a totally different substance.



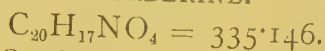
**BERBERIDIS CORTEX.****BARBERRY BARK.**

Barberry bark is the dried bark of the stem of the common barberry, *Berberis vulgaris*, Linn. (N.O. Berberideæ), a shrub growing wild in Great Britain and distributed over the greater part of Europe and Western Asia.

Barberry bark occurs in slightly curved pieces about 5 centimetres long and 12 millimetres broad. The outer surface is of a yellowish-grey colour, and marked with longitudinal furrows and transverse cracks, and often bears the minute black apothecia of lichens. The inner surface of the bark is dark yellowish-brown, fibrous, and longitudinally striated; it often has pieces of the white wood adhering to it. The outer part of the bark has a short fracture, but the inner surface is fibrous and laminated. A transverse section exhibits a thin cork and a dark brown bast traversed by pale yellow medullary rays. The bark has a slight odour and a bitter taste.

The chief constituent of barberry bark is berberine, a bitter, yellow crystalline alkaloid. The drug also contains oxyacanthine and berbamine, colourless crystalline alkaloids.

Barberry bark is a bitter "tonic," and is used in intermittent fevers. It may be given in the form of decoction (1 in 20), infusion (1 in 20), or tincture; but, generally, a salt of the alkaloid berberine is preferred.

**BERBERINA.****BERBERINE.**

Berberine,  $\text{C}_{20}\text{H}_{17}\text{NO}_4 \cdot x\text{H}_2\text{O}$ , is an alkaloid found in *Berberis vulgaris* and other plants. It may be obtained by treating a sulphuric acid solution with baryta water in slight excess, precipitating excess of barium by carbon dioxide, evaporating the filtrate *in vacuo*, and recrystallising from water or alcohol. The alkaloid crystallises with four to six molecules of water, of which only two to two and a-half remain after drying the crystals at 100°.

It occurs when pure in brilliant yellow needles with a fine silky lustre, but more usually it has a brown colour; neutral, odourless, and bitter. It melts at 145° and decomposes above 150°. It is only slightly soluble in water (1 in 500), readily soluble in boiling water and alcohol, almost insoluble in ether or carbon bisulphide. It forms well-crystallised compounds with acetone, chloroform, etc. The aqueous solution is coloured blood-red by chlorine water; on the addition of bromine water it yields a yellow precipitate which darkens rapidly. If a trace of berberine be boiled with concentrated hydriodic acid, the product diluted with water, and made slightly alkaline with ammonia, an intense blackish-violet colour is obtained. Nitric acid oxidises it to berberonic acid.

Berberine is a bitter stomachic "tonic," and is used also against diarrhoea and the vomiting of pregnancy. It is best dispensed in cachets.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**BERBERINÆ CARBONAS.**

BERBERINE CARBONATE.



Berberine carbonate,  $\text{C}_{20}\text{H}_{17}\text{NO}_4\text{H}_2\text{CO}_3 + 2\text{H}_2\text{O}$ , is the salt of a base which is found in *Berberis vulgaris* and many other plants. It may be prepared by passing carbon dioxide into a concentrated alcoholic solution of the alkaloid, when the salt separates out.

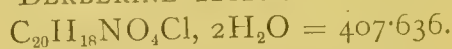
It occurs in yellowish-brown acicular crystals with a bitter taste. Insoluble in cold water; soluble in hot water and alcohol.

Berberine carbonate has similar properties, and is given for similar purposes, to berberine.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**BERBERINÆ HYDROCHLORIDUM.**

BERBERINE HYDROCHLORIDE.



Berberine hydrochloride,  $\text{C}_{20}\text{H}_{17}\text{NO}_4\text{HCl}, 2\text{H}_2\text{O}$ , is the neutral salt of a base which is found in *Berberis vulgaris* and many other plants.

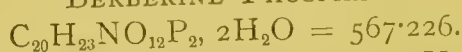
It occurs in bright yellow acicular crystals or powder with a bitter taste. Slightly soluble in water (about 1 in 400) and alcohol, to which, however, it imparts a deep yellow colour; much more soluble in the hot liquid.

Berberine hydrochloride has similar properties to other salts of berberine.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**BERBERINÆ PHOSPHAS.**

BERBERINE PHOSPHATE.



Berberine phosphate,  $\text{C}_{20}\text{H}_{17}\text{NO}_4\text{H}_3\text{PO}_4, 2\text{H}_2\text{O}$ , is the salt of a base which is found in *Berberis vulgaris* and many other plants. It may be prepared by the interaction of berberine-acetone with an excess of phosphoric acid and recrystallising the product, and may contain varying amounts of water of crystallisation.

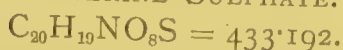
It occurs in bright yellow crystals with a bitter taste. It is the most soluble salt of berberine. Soluble in water (1 in 15) and precipitated by excess of alcohol.

Berberine phosphate has similar properties to other salts of berberine, but it is much more soluble in water. It is given in mixture form with chloroform water, or it may be dispensed in cachets or pills, the latter being massed with a minimum of syrup of glucose.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**BERBERINÆ SULPHAS.**

BERBERINE SULPHATE.



Berberine sulphate,  $\text{C}_{20}\text{H}_{17}\text{NO}_4\text{H}_2\text{SO}_4$ , is the acid salt of a base which is found in *Berberis vulgaris* and many other plants. It may be prepared by boiling the powdered drug with water acidulated with acetic acid. The decoction is filtered, evaporated to a syrupy liquid and mixed with three times its volume of 20 per cent. sulphuric acid. The crystals thus obtained are washed with cold water, dissolved in boiling water, and, after the addition of alcohol and some sulphuric acid, again allowed to crystallise.

The salt occurs in bright yellow acicular crystals with a bitter taste. It is only sparingly soluble in water (about 1 in 150) or alcohol.

Berberine sulphate has similar properties to other salts of berberine.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**BERBERIS.**

BERBERIS.

Berberis is the dried stem of *Berberis aristata*, DC. (N.O. Berberideæ), a shrub indigenous to India and Ceylon.

The drug occurs in slightly undulating pieces, from 2.5 to 5 centimetres in diameter, yellowish-brown and striated externally, bright yellow internally. The transverse section exhibits a narrow brown cork, a broader yellowish-brown bast-ring, and a large yellow wood. The bast-ring is traversed by conspicuous yellow medullary rays, and is laminated. The wood exhibits numerous distinct medullary rays and small vessels.

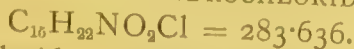
The chief constituents of berberis are the bitter alkaloid berberine, and other substances of an alkaloidal nature, which have not been fully investigated, together with tannin, resin, gum, and starch.

Berberis has similar properties to those of barberry bark. It is used in India and the Eastern Colonies as a bitter tonic in intermittent fevers. A tincture and a concentrated solution (infusion) are prepared.

NOTES.—Berberis is sanctioned for use in India and the Eastern Colonies. In the Indian Pharmacopœia of 1868 the root-bark of *B. aristata*, DC., *B. Lycium*, Royle, and *B. asiatica*, Roxb., were official, and the stems of species other than *B. aristata* appear to occur in commerce under that name. One of these consists of the fragments of a stem which differs from that of *B. aristata* in its larger vessels and broad medullary rays, but resembles it in other respects. Berberis, U.S.P., consists of the rhizome and rootlets of *B. Aquifo'ium*, Pursh., and other species.

**BETACAINÆ HYDROCHLORIDUM.**

BETACAINE HYDROCHLORIDE.



Betacaine hydrochloride,  $\text{C}_{15}\text{H}_{21}\text{NO}_2, \text{HCl}$ , is a salt of benzoyl-vinyl-diaceton-alkamine, a basic principle which is obtained syn-



thetically. It may be prepared by treating diacetoneamine with paraldehyde, reducing the resulting product by means of metallic sodium to vinyl-diaceton-alkamine, and benzoylating the latter with benzoyl chloride. The free base is neutralised by hydrochloric acid, and the salt crystallised.

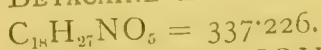
It occurs in the form of a white, crystalline powder, which is neutral or only feebly alkaline. Soluble in water (1 in 30), and alcohol (1 in 10). Melting-point,  $268^{\circ}$ , with decomposition. Solution of potassium iodide gives no precipitate (distinction from alphacaine hydrochloride). On adding ammonia to a 1 per cent. solution a white precipitate is produced, which dissolves immediately on adding an equal volume of strong solution of ammonia (distinction from alphacaine hydrochloride). If a small amount be rubbed with dry mercurous chloride and then moistened with alcohol the mixture should not darken in colour (distinction from cocaine and alphacaine hydrochlorides). It dissolves in concentrated sulphuric and nitric acids without colouration. It is incompatible with salicylic acid.

Betacaine has only one-fifth of the toxic power of cocaine. Its anæsthetic action is slower than that of cocaine, being fully developed in about twenty minutes. Betacaine does not constrict the blood vessels nor dilate the pupil of the eye. Its action is much deepened and prolonged, whilst absorption is checked, by combination with adrenaline, as in the production of infiltration analgesia. Solutions of betacaine salts may be sterilised by boiling, without decomposition, and they keep much better when thus prepared than do solutions of cocaine salts. For prolonged local anæsthesia by infiltration, solutions of betacaine hydrochloride are used (*a*) without and (*b*) with adrenaline: (*a*) Betacaine hydrochloride, 1; sodium chloride, 8; sterilised water, 1000. (*b*) Betacaine hydrochloride, 2; sodium chloride, 8; adrenaline, 0.01; sterilised water, 1000. The quantity of solution used varies according to the purpose; 18 centigrams (3 grains) of the betacaine salt may be used without risk, and 30 centigrams (5 grains) have been given. On account of its greater solubility, betacaine lactate is rapidly displacing the hydrochloride.

NOTES.—Betacaine and its salts are also known under the trade-name Eucaine or  $\beta$ -Eucaine. Alphacaine or  $\alpha$ -Eucaine,  $C_{19}H_{27}NO_4$ , differs from betacaine in constitution, and the solubility of its hydrochloride in water is greater (1 in 10). The use of alphacaine salts has been discontinued on account of the smarting and irritation that precede the anæsthesia, especially when solutions of the salts are applied to the eye.

## BETACAINÆ LACTAS.

### BETACAINÆ LACTATE.



Betacaine lactate,  $C_{15}H_{21}NO_5$ , is a salt of benzoyl-vinyl-diaceton-alkamine, a basic principle which is obtained synthetically, as described under Betacainæ Hydrochloridum.

It occurs as a white, crystalline powder, with a melting-point of  $155^{\circ}$ . Readily soluble in water (1 in 5); soluble in

alcohol (1 in 8). The proportion of betacaine in the lactate is slightly less than that in the hydrochloride—100 grammes of the hydrochloride containing as much of the base as 119 grammes of the lactate.

On account of the permanence of its solutions up to a 20 per cent. strength, the use of betacaine lactate is much preferable to that of the hydrochloride for the preparation of spray solutions and local applications. Solutions of betacaine lactate may be sterilised by boiling, without decomposition. Salicylic acid should not be added, or betacaine salicylate may be deposited. Solutions of the following strength may be employed:—In ophthalmic work and dentistry, 2 to 3 per cent.; for infiltration anæsthesia, 0·12 per cent.; for regional anæsthesia, 2 to 5 per cent.; and for the nose, throat, and ear, 10 to 15 per cent. solutions. An addition of sodium chloride should be made to the weaker solutions, thus—for solutions under 1 per cent., add 0·8 per cent. sodium chloride; for 1 to 2 per cent. solutions add 0·2 per cent. of the chloride.

NOTE.—The notes under *Betacainæ Hydrochloridum* apply also in this case.

## BETEL.

### BETEL.

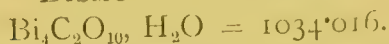
Betel consists of the fresh or dried leaves of *Piper Betle*, Linn. (N.O. Piperacæ), a shrub indigenous to and cultivated in India, Ceylon, and Malay Islands. The leaves are picked while green, pressed together by means of stones, and dried, when they become brown in colour and brittle. They generally occur in commerce tied up in small packets.

The leaves are broadly ovate in shape, about 16 centimetres long and 10 centimetres broad. They are unequally cordate at the base and acuminate at the apex. They have five to seven well-marked lateral veins which curve round to the apex. They are of a dull brown colour, and brittle, thin, not coriaceous in texture, and glossy; they have a slight and warm aromatic taste. Examined under the microscope they exhibit a multitude of rounded oil cells filled with a dark brown secretion. Certain of the epidermal and hypodermal cells contain colourless siliceous deposits, while the walls of many epidermal and other cells are impregnated with silica.

The chief constituent of the leaves is the volatile oil, of which they contain between 0·2 and 1·0 per cent. Specific gravity, 0·958 to 1·044. This oil varies in the leaves from different countries. Two phenols, betel-phenol (chavibetol) and chavicol, have been isolated, the former of which has been found in all betel oils, and may therefore be taken as characteristic. Betel phenol is isomeric, but not identical, with eugenol. Cadinene has also been found in betel oil.

Fresh betel leaves are used in India as a masticatory for their stimulant and carminative properties; the juice obtained from them has similar properties.

NOTE.—Betel is sanctioned for use in India and the Eastern Colonies

**BISMUTHI CARBONAS.****BISMUTH CARBONATE.**

*Synonyms.*—Bismuth Oxycarbonate; Bismuth Subcarbonate.

Bismuth carbonate or oxycarbonate,  $(\text{Bi}_2\text{O}_2\text{CO}_3)_2, \text{H}_2\text{O}$ , may be prepared by mixing nitric acid, 4, with distilled water, 3, and adding, in successive portions, purified bismuth in small pieces, 2. When all action has ceased, the mixture is heated nearly to boiling-point for ten minutes, allowed to settle, and decanted from any insoluble matter. The clear liquid is then evaporated to 2, and added gradually, with constant stirring, to a cold filtered solution of ammonium carbonate, 6, in distilled water, 40.

It occurs as a whitish powder of varying density, odourless and tasteless; insoluble in water, but soluble in fairly strong mineral acids. It should be free from silver, lead, copper, arsenium, iron, zinc, calcium, magnesium, selenium, tellurium, chlorides, and sulphates. It should not contain more than traces of nitrates. If dissolved in hydrochloric acid, and the bismuth precipitated as sulphide the washed and dried precipitate may be used to determine the amount of bismuth present, but it is preferable to convert the salt into oxide and weigh as such. Bismuth carbonate should yield not less than 90 per cent. of pure bismuth oxide on ignition. Commercial samples sometimes contain more than a trace of nitrate. Bismuth salts generally are darkened in colour by sulphides and hyposulphites; in the presence of iodides the brownish-red oxyiodide is formed.

Salts of bismuth are prescribed for their local action. Given by the mouth, they form an adhesive coating to the walls of the stomach and intestine, protecting them from irritation caused by food and the secretions, and allaying inflammation. They are thus of great use in dyspepsia and vomiting, gastric inflammation and gastric ulcer, and diarrhœa from any cause. Externally, bismuth is sedative and astringent. Some salts, especially the subnitrate, are used in the form of ointment, lotion, or dusting powder, in irritable conditions of the skin. Absorption may occur from large raw surfaces with symptoms of poisoning, but practically never when the bismuth compounds are taken by the mouth. The mildly astringent and protective action of bismuth compounds upon the mucous membranes is of service in gonorrhœa and leucorrhœa (lotions, 1 in 12) and in nasal catarrh (see *Insufflatio Bismuthi et Morphinæ*).

Bismuth carbonate may be prescribed in cachets mixed with powdered rhubarb, or such carminatives as compound powder of cinnamon. For dispensing in mixtures, carbonate of bismuth may be combined with the alkaline bicarbonates or with the carbonates of magnesium or calcium. Glycerinum Bismuthi Carbonatis is a useful preparation, containing about 50 per cent. of bismuth carbonate. The addition of mucilage or powdered gum to mixtures containing the insoluble salts of bismuth is usually unnecessary,

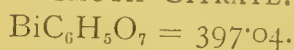


and may cause the powder to aggregate into indiffusible masses. Compound infusion of orange suspends bismuth salts without rendering the deposit coherent, and is the best vehicle for this purpose. For administration in lozenge form *Trochiscus Bismuthi Compositus* is prepared, or soft gelatin pastilles may be made containing a larger proportion of bismuth, with morphine or cocaine if desired. Bismuth carbonate is incompatible with acids, acid salts, iodides, tannin, and sulphur.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### BISMUTHI CITRAS.

BISMUTH CITRATE.



Bismuth citrate,  $\text{BiC}_3\text{H}_4\text{OH}(\text{COO})_3$ , may be obtained by mixing bismuth subnitrate, 100, and citric acid, 75, with distilled water, 400, and heating on a water-bath with frequent stirring until a drop of the mixture yields a clear solution with ammonia water; then adding 5,000 of water, allowing the salt to deposit, washing the precipitate thus obtained until the washings are tasteless, and drying at a gentle heat.

It occurs as a white crystalline powder without odour or taste. Insoluble in water and alcohol; soluble in solution of ammonia or of alkaline citrates. It should be free from arsenium, lead, copper, silver, chlorides and sulphates, and should only contain a trace of nitrate. If 1 gramme be ignited, the cooled residue dissolved in 5 mils of nitric acid, the solution evaporated to dryness, and the residue ignited, from 58 to 60 per cent. of bismuth oxide should be left. The citrate generally contains between 2 and 3 per cent. of absorbed moisture.

Bismuth citrate has the same medicinal properties as bismuth carbonate and subnitrate.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

### BISMUTHI ET AMMONII CITRAS.

BISMUTH AND AMMONIUM CITRATE.

*Synonym.*—Bismuth-ammonium Citrate.

Bismuth and ammonium citrate is prepared by dissolving bismuth citrate in ammonia, filtering, evaporating the solution to a syrupy consistence and spreading on glass plates to dry.

It occurs as shining, semi-opaque scales, or as a white, odourless powder, and has a slightly metallic taste. It is neutral or faintly alkaline to litmus. Soluble in cold water, more readily on heating, and slightly soluble in alcohol. It should be free from the impurities mentioned under *Bismuthi Citras*. After ignition, the residue being moistened with nitric acid and reheated, at least 48 per cent. of bismuth oxide should be left.

Bismuth and ammonium citrate is best administered in aqueous solution. Unlike the insoluble salts of bismuth, it is somewhat

astringent and irritating, and should not therefore be prescribed when there is acute inflammation. Four decigrams (6 grains) of bismuth and ammonium citrate are about equal to 4 mils (1 fluid drachm) of *Liquor Bismuthi et Ammonii Citratis*.

*Dose*.—1 to 3 decigrams (2 to 5 grains).

### BISMUTHI ET AMMONII CITRAS EFFERVESCENS.

EFFERVESCENT BISMUTH AND AMMONIUM CITRATE.

*Synonym*.—Effervescent Bismuth-ammonium Citrate.

Bismuth and Ammonium Citrate, in powder	...	8.00
Sodium Bicarbonate, in powder	...	46.00
Tartaric Acid, in powder	...	24.00
Citric Acid, in powder	...	16.00
Refined Sugar, in powder	...	16.00

Mix and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100.

*Dose*.—2 to 4 grammes (30 to 60 grains).

### BISMUTHI HYDROXIDUM.

BISMUTH HYDROXIDE.



*Synonym*.—Bismuth Oxyhydrate.

Bismuth hydroxide or oxyhydrate,  $\text{BiOOH}$ , may be prepared by decomposing a solution of bismuth nitrate in diluted nitric acid with ammonia, filtering and washing the precipitate, and drying it at a temperature not exceeding  $60^\circ$  to  $70^\circ$ .

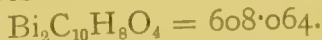
It occurs as a white, amorphous, odourless, and tasteless powder. Insoluble in water, but soluble in acids, and in a mixture of glycerin and sodium hydroxide solution. It should be free from other metals, and from chlorides and nitrates. On ignition, it should leave 96.26 per cent. of bismuth oxide.

Bismuth hydroxide has the same action as bismuth carbonate, but it is seldom used.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

### BISMUTHI NAPHTHOLAS.

BISMUTH NAPHTHOLATE.



*Synonym*.—Bismuth Beta-naphtholate.

Bismuth naphtholate,  $\text{Bi}_2\text{O}_2(\text{OH})\text{C}_{10}\text{H}_7\text{O}$ , may be obtained by the action of sodium naphtholate on bismuth nitrate, or of an alkaline solution of  $\beta$ -naphthol on a solution of bismuth nitrate in diluted glycerin or acid.

It occurs as a pinkish-brown powder, darkening on keeping, odourless, nearly tasteless, and neutral. Insoluble in water, slightly soluble in alcohol. It has all the antiseptic without the toxic pro-

erties of the individual constituents. It should be free from sharp odour or burning taste (distinction from a mere mixture of naphthol and bismuth salt).

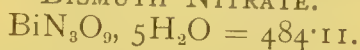
Bismuth naphtholate is decomposed in the intestine,  $\beta$ -naphthol being liberated. It is employed as an intestinal disinfectant, its action in this respect resembling that of naphthol. The naphtholate is often employed in combination with sodium bicarbonate and willow charcoal, and is best given enclosed in a cachet.

*Dose.*— $\frac{1}{2}$  to 1 gramme (8 to 15 grains).

*NOTE.*—Bismuth naphtholate is also known under the trade-name Orphol.

### BISMUTHI NITRAS.

BISMUTH NITRATE.



Bismuth nitrate,  $\text{Bi}(\text{NO}_3)_3, 5\text{H}_2\text{O}$ , may be obtained by dissolving bismuth, or its oxide or carbonate, in nitric acid and crystallising.

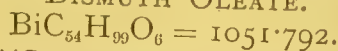
It occurs in colourless, deliquescent crystals, soluble in a very small quantity of water, forming a strongly acid solution, the addition of more water, however, causing a separation of bismuth subnitrate; soluble in acids and in glycerin; insoluble in alcohol. It melts at  $73^\circ$  in its water of crystallisation, and is decomposed at a higher temperature.

Bismuth nitrate is soluble in cold glycerin, forming a clear solution, which deposits on the addition of water. For use in skin diseases, 4 grammes (60 grains) of bismuth nitrate may be dissolved without heat in 30 mls (1 fluid ounce) of glycerin. Applications one-fourth to one-sixth of this strength are also used.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

### BISMUTHI OLEAS.

BISMUTH OLEATE.



Bismuth oleate,  $\text{Bi}(\text{C}_{18}\text{H}_{33}\text{O}_2)_3$ , may be obtained by the interaction of solutions of bismuth nitrate and hard soap.

It occurs as a white or yellowish powder. Soluble in ether. It yields on ignition 22.09 per cent. of bismuth oxide.

Bismuth oleate may be employed with zinc oxide or powdered starch as a dusting powder in hyperæmic conditions of the skin. An ointment may be prepared by mixing the oleate with 4 to 6 parts of benzoated lard.

*NOTE.*—Bismuth oleate can be obtained as a paste by triturating bismuth oxide with four times its weight of oleic acid.

### BISMUTHI OXIDUM.

BISMUTH OXIDE.



Bismuth oxide,  $\text{Bi}_2\text{O}_3$ , may be prepared by the interaction of bismuth oxynitrate with boiling solution of sodium hydroxide.



It occurs as a lemon-yellow powder, insoluble in water, soluble in moderately strong acids. It should be free from the impurities mentioned under Bismuthi Carbonas and from carbonate. Converted into sulphide and weighed, 100 per cent. of bismuth oxide should be indicated.

Bismuth oxide resembles in its properties the carbonate and subnitrate. It forms with benzoated lard (1 in 8) a useful sedative ointment, which in some cases is an advantageous substitute for zinc ointment.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### BISMUTHI OXYIODIDUM.

BISMUTH OXYIODIDE.



*Synonyms.*—Bismuth Subiodide; Bismuthyl Iodide.

Bismuth oxyiodide, BiOI, may be prepared by adding slowly, with constant stirring, a solution of bismuth nitrate, 95.4, in glacial acetic acid, 120, to a solution of potassium iodide, 33.2, and sodium acetate, 50, in distilled water, 2000, the resulting precipitate being repeatedly washed by decantation, and dried at 100°.

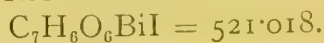
It occurs as a brick-red or brownish-red amorphous and tasteless powder, with a slight odour of iodine. Insoluble in water, alcohol, ether, or chloroform. Heated in a dry tube it gives off violet vapours of iodine, leaving a residue of oxide. Acids and alkalis decompose it. It contains about 36 per cent. of iodine. It should be kept dry and protected from light and air.

Bismuth oxyiodide is given internally in ulcer of the stomach, and is used externally to ulcers and sores as a substitute for iodoform. Suspended in 100 parts of water it is used as an injection in gonorrhœa.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

### BISMUTHI OXYIOGALLAS.

BISMUTH OXYIOGALLATE.



*Synonym.*—Bismuth Oxyiodosubgallate.

Bismuth oxyiogallate,  $\text{Bi}(\text{OH})\text{IC}_6\text{H}_2(\text{OH})_3\text{CO}_2$ , may be prepared by treating bismuth oxyiodide with gallic acid, or by heating bismuth subgallate, 10, with hydriodic acid, 3.1, until a greyish-green product is obtained, the resulting powder being subsequently well washed and dried at a moderate temperature. It contains 44.58 per cent. of bismuth oxide and 24.33 per cent. of iodine.

It occurs as a bulky, greyish or greyish-green odourless and tasteless powder, which tends to become coloured on exposure to moist air. Insoluble in water, alcohol, ether or chloroform; soluble in alkaline solutions and diluted mineral acids with decomposition; concentrated sulphuric acid liberates iodine vapours.

Bismuth oxyiodogallate is used chiefly as an application in skin diseases in which an astringent and protective powder is indicated. It is free from toxic and irritant properties and covers about four times as much surface as an equal weight of iodoform, for which it may be used as a substitute. It may be applied to burns and ulcers, and as a dusting powder after operations; it is also used in the form of ointment (10 per cent.) prepared with soft paraffin and anhydrous wool-fat. In gonorrhœa it may be injected by means of an insufflator, or used suspended with glycerin as a fluid injection.

NOTE.—Bismuth oxyiodogallate is also known under the trade-names Aiol, Airoform, and Airogen.

### BISMUTHI PHENAS.

#### BISMUTH PHENATE.



*Synonyms.*—Bismuth Phenolate; Phenol Bismuth;  
Bismuth Carbolate.

Bismuth phenate,  $\text{Bi}(\text{OH})_2\text{C}_6\text{H}_5\text{O}$ , may be prepared by mixing a solution of bismuth nitrate or chloride with an alkaline solution of phenol, and washing and drying the precipitate formed. It contains 69.28 per cent. of bismuth oxide.

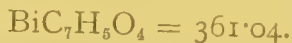
It occurs as a greyish-white or greyish-brown amorphous powder, neutral, almost odourless and tasteless. Insoluble in water or alcohol. It is decomposed by hydrochloric acid into bismuth chloride and phenol; and also by nitric acid, which forms with the phenol a yellow-coloured product.

When taken internally, bismuth phenate is decomposed both by the gastric and pancreatic juices. It is used chiefly as an intestinal antiseptic and occasionally as a dusting powder. Bismuth phenate is best given internally, enclosed in cachets or in glutoid capsules.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### BISMUTHI SALICYLAS.

#### BISMUTH SALICYLATE.



*Synonyms.*—Bismuth Oxysalicylate; Bismuth Subsalicylate.

Bismuth salicylate,  $\text{C}_6\text{H}_4\text{OIIICOO}(\text{BiO})$ , may be prepared by the action of salicylic acid on freshly precipitated bismuth hydroxide.

It occurs as a white, odourless, tasteless, amorphous or crystalline powder. Insoluble in water, alcohol, or glycerin. It is partly dissociated by contact with water or alcohol, and is more rapidly decomposed by hot water, with the liberation of salicylic acid and the formation of a more basic salt. It should be free from the impurities mentioned under Bismuthi Carbonas, from more than traces of nitrates, and from free salicylic acid. No samples will pass the official test for free salicylic acid, since alcohol causes partial decomposition; it is better to treat the salt with

benzol or chloroform, filter carefully, and shake the filtrate with very dilute solution of ferric chloride. It should leave 62 to 64 per cent. of bismuth oxide on ignition; the official formula requires 64.30 per cent. of bismuth oxide.

Bismuth salicylate is a valuable intestinal antiseptic and sedative. It is especially useful in the summer diarrhœa of children, in dysentery and typhoid fever. It should not be prescribed with alkaline carbonates, as the mixture effervesces. Bismuth salicylate does not mix readily with water. It may be triturated in a mortar with mucilage to a smooth cream, and diluted with water. Alcohol and tinctures also render the salicylate miscible, and avoid the objection against mucilage that it causes the deposited salt to cohere. In dry form, bismuth salicylate is best dispensed in cachets.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### BISMUTHI SUBCHLORIDUM.

BISMUTH SUBCHLORIDE.



*Synonyms.*—Bismuth Oxychloride; Bismuthyl Chloride.

Bismuth subchloride,  $\text{BiOCl}$ , may be prepared by adding a solution of bismuth nitrate to a solution of sodium chloride, or by adding a solution of bismuth nitrate to very dilute hydrochloric acid; it may also be prepared by pouring a solution of bismuth oxide in hydrochloric acid into water.

It occurs as a lustrous, impalpable white powder. Insoluble in water; readily soluble in acids. It should contain not more than a trace of nitrate, and be free from the other impurities mentioned under Bismuthi Carbonas.

Bismuth subchloride may be used internally and externally in place of other inorganic salts of bismuth. The fineness of the powder and the readiness with which it adheres to the skin make it in considerable demand as a cosmetic. It is applied to mucous membranes by insufflation, and is used in suppositories (10 grains each) or as an ointment (6 per cent.) for hæmorrhoids and dysentery.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

NOTES.—Bismuth oxychloride prepared by precipitating bismuth nitrate with sodium chloride is known as "blanc d'Espagne" or flake white. When similarly prepared by precipitation with dilute hydrochloric acid it is termed "blanc de perle" or pearl white.

### BISMUTHI SUBGALLAS.

BISMUTH SUBGALLATE.



*Synonym.*—Bismuth Oxygallate.

Bismuth subgallate,  $\text{Bi}(\text{OH})_2\text{C}_7\text{H}_6\text{O}_6$ , is prepared by the action of gallic acid on freshly precipitated bismuth hydroxide.



It occurs as a citron-yellow, odourless, and tasteless powder. Insoluble in water, ether, and alcohol; readily soluble in the hot mineral acids, with decomposition, and in solutions of the alkaline hydroxide, forming clear yellow solutions, rapidly turning to deep red. On heating, it decomposes without melting. If the bismuth be removed by sulphuretted hydrogen, the solution, after boiling to remove the dissolved gas and cooling, gives a bluish-black colour with ferric chloride. On ignition, with the aid of nitric acid, 52 to 57 per cent. of bismuth oxide should be left. It should be free from sulphates, chlorides, nitrates, and from other metals. It should be entirely insoluble in alcohol (absence of gallic acid), and completely soluble in solution of sodium hydroxide (absence of other bismuth salts).

Bismuth subgallate has no astringent properties and is used as a dusting powder, either alone or diluted with starch, in the place of iodoform. Internally it may be given in cachets, or in mixture form. It is employed as an ointment (10 per cent.); also as an injection (8 per cent.), thickened with mucilage of starch, for gonorrhœa. Suppositories for use against piles contain 6 decigrams (10 grains in each).

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

*NOTE.*—Bismuth subgallate is also known under the trade-name Dermatol.

### BISMUTHI SUBNITRAS.

BISMUTH SUBNITRATE.

$\text{BiNO}_3, \text{H}_2\text{O} = 304.025.$

*Synonyms.*—Bismuth Oxynitrate; Bismuthyl Nitrate.

Bismuth subnitrate,  $\text{BiONO}_3, \text{H}_2\text{O}$ , may be prepared by pouring a solution of bismuth nitrate into a large excess of water. The salt as met with in commerce more nearly corresponds to the formula  $\text{BiONO}_3, \frac{1}{2}\text{H}_2\text{O}$  ( $=295.018$ ), than to the official formula given above.

It occurs as a heavy white micro-crystalline powder, odourless, tasteless, and slightly acid to litmus. Insoluble in water or alcohol; readily soluble in nitric or hydrochloric acid. It should be free from the impurities mentioned under Bismuthi Carbonas, from calcium phosphate, and from more than traces of carbonate. According to the official formula, it should yield 76.33 per cent. of bismuth oxide, but good commercial specimens usually yield as much as 80 per cent. As mentioned under Bismuthi Carbonas, bismuth salts are darkened in colour by sulphides and thiosulphates and give rise to a brownish-red colour (due to bismuth oxyiodide) in the presence of iodides.

The general properties of bismuth salts are described under Bismuthi Carbonas. Bismuth subnitrate possesses astringent properties, owing to the free acid liberated when it is brought in contact with water. The subnitrate is administered internally as a powder or in cachets, but more frequently in mixtures, which may be thickened with syrup or glycerin. The addition of gummy

suspending agents is objectionable, as they cause the insoluble salts to cohere and form indiffusible masses. No suspending agent should be added unless one has been specifically ordered. An ideal vehicle for the administration of salts of bismuth is compound infusion of orange, which suspends the insoluble salt without rendering it coherent. In consequence of the hydrolysis with liberation of nitric acid, which this salt undergoes in the presence of water, it should not be prescribed with alkali carbonates and bicarbonates; the carbonate or oxide of bismuth should be used instead. In dispensing mixtures containing the subnitrate and a bicarbonate or carbonate, the two reacting salts may be rubbed together with warm water and the conversion to carbonate accomplished before the mixture is completed. Bismuth subnitrate is used as a dusting powder and in lotions and injections. Injections for gonorrhœa may contain 60 grains or less per fluid ounce, simply mixed with water or suspended with glycerin or mucilage of starch. An ointment (1 in 8) is occasionally employed. Bismuth subnitrate is a constituent of Ferrier's snuff (*Insufflatio Bismuthi cum Morphina*), which is used as a remedy for nasal catarrh.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### BISMUTHI TANNAS.

#### BISMUTH TANNATE.

Bismuth tannate may be prepared by mixing freshly prepared bismuth hydroxide with tannic acid and drying.

It occurs as a brownish-yellow powder, odourless, tasteless, insoluble in water, alcohol, or ether, but soluble in acids. It leaves about 46 per cent. of bismuth oxide on ignition.

Bismuth tannate is used in diarrhœa and dysentery as an astringent and intestinal sedative. It is best given enclosed in cachets, or in glutoid capsules.

*Dose.*— $\frac{1}{2}$  to 2 grammes (7 to 30 grains).

### BOLDO FOLIA.

#### BOLDO LEAVES.

Boldo leaves are obtained from *Peumus Boldus*, Molina (N.O. Monimiaceæ), a dioecious evergreen tree indigenous to the central provinces of Chili. They are collected and dried.

The leaves are ovate or elliptical in shape, 4 to 8 centimetres long, shortly petiolate, greyish-green in colour, coriaceous, and brittle. The margin is entire and slightly revolute, the apex obtuse. The midrib and veinlets are prominent on the under surface. Both surfaces bear numerous emergences, each of which is crowned with a group of one-celled, thick-walled hairs, which, however, are very readily broken off. The transverse section is sharply characterised by the

presence of a well-marked hypoderma below the upper epidermis, by numerous oil-cells in the mesophyll, and by the emergences bearing the hairs previously referred to. The drug has an aromatic odour and a pungent, camphoraceous, bitter taste.

The principal constituents of boldo leaves are about 2 per cent. of volatile oil (specific gravity, 0.915 to 0.945; optical rotation  $+2^{\circ} 25'$  to  $-1^{\circ} 40'$ ; boiling temperature,  $175^{\circ}$  to  $250^{\circ}$ ; refractive index, 1.4777) in which, in addition to terpenes, terpineol has been detected. The leaves also contain a bitter alkaloid, boldine (0.1 per cent.), and a glucoside, boldin or boldoglucin. They yield about 10 per cent. of ash.

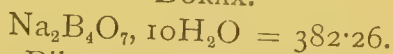
Boldo leaves are employed in Chili and other South American countries in chronic hepatic congestion and as an aromatic tonic and diuretic in gonorrhœa, cystitis, and other bladder affections. Its diuretic and stimulant properties are apparently due to the volatile oil. The alkaloid, boldine, has been recommended for use as a hypnotic; also in combination with calomel in liver congestion. It has weak local anæsthetic properties. Boldoglucin, the glucoside of boldo, also possesses hypnotic properties, and has been given internally in capsules, 18 centigrams (3 grains) in each. Boldo is now used principally in the form of tincture, as a liver stimulant and diuretic.

*Dose.*—~~2 to 5 milligrams ( $\frac{1}{30}$  to  $\frac{1}{10}$  grain).~~

NOTES.—The leaves of *Cryptocarya peumus*, Nees (N.O. Laurineæ), which grows in the same districts as boldo, closely resemble boldo leaves; they may be distinguished by their darker colour, by the wavy margin, and by the absence of hairs.

## BORAX.

BORAX.



*Synonyms.*—Sodium Biborate; Sodium Pyroborate; Sodii Boras.

Borax,  $\text{Na}_2\text{B}_4\text{O}_7, 10\text{H}_2\text{O}$ , occurs native, but is usually prepared by the combination of boric acid and sodium carbonate, or from boracite.

It occurs in colourless, efflorescent crystals, or as a white powder, with an alkaline reaction, inodorous, and having a sweetish alkaline taste. Soluble in water (1 in 25), in boiling water (2 in 1), in glycerin (1 in 1 by weight); insoluble in alcohol. When heated it loses part of its water of crystallisation and swells up, and at a red heat loses all its water of crystallisation (47.13 per cent.) and fuses to a colourless glass. It should be free from lead, copper, arsenium, iron, calcium, magnesium, carbonates, nitrates, and phosphates, and contain not more than traces of chlorides or sulphates. Titrated with standard acid, 98.6 per cent. of crystallised borax should be indicated.

Borax has a sedative action when applied externally. It is also mildly antiseptic, its action in this respect resembling that of boric

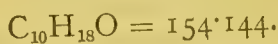


acid. It is rarely used internally, though it has been recommended for epilepsy. For external use it is employed in gargles, lotions, and injections. Glycerinum Boracis is used as a paint for the tongue and throat, especially for children; Mel Boracis is applied to the mouth in aphthous conditions. Borax makes a good sedative lotion in inflammatory conditions of the skin, and exercises a cleansing effect upon the scalp when used as a hair-wash. It is an ingredient in tincture of myrrh and borax, and is of service for chilblains in the form of an ointment (1 in 8). Though borax is an antiseptic, its germicidal properties are weak. Considerable quantities are used for preserving food products, usually in combination with an equal quantity of boric acid. It is incompatible with mineral acids and their metallic salts, and with mucilage of acacia. It precipitates many alkaloids from their salts. Borax is decomposed by glycerin, forming boric acid and glyceryl borate; a mixture of borax and glycerin, therefore, effervesces with alkali bicarbonates.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

## BORNEOL.

BORNEOL.



*Synonyms*.—Bornyl Alcohol; Borneo Camphor.

Borneol,  $\text{C}_{10}\text{H}_{17}\text{OH}$ , is a saturated alcohol, obtained from *Dryobalanops aromatica*, Gaertn. (*D. Camphora*, Colebrook, N.O. *Dipterocarpeæ*), and other plants, or prepared by the reduction of camphor.

It occurs in white crystals, with an odour of pepper and camphor, and a pungent taste. Very slightly soluble in water, soluble in alcohol and ether. Somewhat volatile at ordinary temperatures, but does not collect in crystals on the sides of its glass container. Melting-point,  $203^{\circ}$  to  $204^{\circ}$ . Boiling-point,  $212^{\circ}$ . Specific gravity, 1.011. The artificial product is a mixture of about 80 per cent. of borneol, and 20 per cent. of isoborneol; this mixture melts at  $206^{\circ}$  to  $207^{\circ}$ .

Borneol resembles ordinary camphor in its properties, and forms esters, some of which are used in medicine. Bornyl or borneol salicylate (Salit) is an oily liquid with a faint aromatic odour. It dissolves readily in alcohol and oils, and is mixed with an equal quantity of olive oil for external application in rheumatism and neuralgia, from 2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm) of the mixture being used for an inunction. Bornyl valerate or borneol isovalerianate (Bornyval or Hysterol) is a liquid with a faint odour of valerian. It is soluble in alcohol and ether, and is given in gelatin capsules containing 25 centigrams (4 grains) in hysteria and neurotic conditions.

**BOROLYCEERINUM.**

## BOROLYCEERIN.

Boric Acid, in powder	...	...	...	...	47·00
Glycerin, by weight	...	...	...	...	64·00

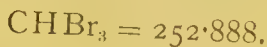
Add 32 of the boric acid to the glycerin, heat to a temperature not exceeding 150°, maintain at that temperature until the weight of the mixture is reduced to 85; then cool, add the remainder of the boric acid, and mix.

Boroglycerin is a white, viscid, opaque liquid of honey-like consistence. Readily soluble in water and alcohol, the glyceryl borate it contains being resolved into its constituents in the presence of water. Boroglycerin thus provides a ready means of obtaining boric acid in a soluble condition. It possesses similar mild antiseptic properties to Glycerinum Acidi Borici, and its solutions have been found useful for application to mucous membranes. Aqueous solutions of boroglycerin are also employed for preservative purposes.

NOTES.—Boroglycerin resembles a preparation which was made by a patented process and known as Boroglyceride. It corresponds to the Boroglycerinum of the National Formulary, and can be converted into Glyceritum Boroglycerini, U.S.P., by adding an equal weight of glycerin to the finished boroglycerin while it is still warm.

**BROMOFORMUM.**

## BROMOFORM.



*Synonyms.*—Formyl Tribromide; Tribrom-methane.

Bromoform,  $\text{CHBr}_3$ , may be prepared by the action of bromine on a solution containing equal parts of potassium hydroxide and alcohol, or by shaking acetone with a solution of sodium hypobromite. The separated bromoform is washed with sodium carbonate solution, freed from water by calcium chloride, and rectified.

It occurs as a colourless, heavy liquid with an odour resembling chloroform and a sweetish taste. Soluble in water (1 in 800); in all proportions of alcohol, ether, benzene, fixed and volatile oils; in glycerin (about 1 in 80). Cooled with ice it freezes, melting again at 7°. Boiling-point, 148° to 150°. Specific gravity, 2·83. Water shaken with it should give no precipitate with silver nitrate nor should it give a blue colour on the addition of potassium iodide and starch. Shaken with concentrated sulphuric acid, no colour should be developed in ten minutes.

Bromoform possesses general anæsthetic properties like those of chloroform, but it is not sufficiently volatile for inhalation. It is used in whooping-cough, preferably in capsules, each containing  $\frac{1}{2}$  or 1 minim dissolved in almond oil. Bromoform is too dense a liquid

to be dispensed safely with aqueous vehicles, as there is always a risk of an excessive amount being taken in the last dose of the mixture. It is preferable, therefore to dispense it in the form of an emulsion, prepared by dissolving the bromoform in thrice its volume of almond oil or cod-liver oil, and emulsifying with gum acacia in the usual manner. Cases of poisoning in children have resulted from the use of bromoform. In such cases the stomach-pump should be used and artificial respiration resorted to if necessary. Though the symptoms are alarming, they are seldom followed by fatal results.

*Dose.*—3 to 12 centimils ( $\frac{1}{2}$  to 2 minims).

*NOTES.*—Bromoform should be kept sheltered from the light, as when it becomes yellow from exposure it is unfit for medicinal use. Bromoformum, U.S.P., contains 1 per cent. of absolute alcohol.

## BROMUM.

BROMINE.

Br = 79.96.

Bromine is a liquid non-metallic element obtained from sea-water and other native sources.

It occurs as a dark, red-brown, heavy, mobile liquid, giving off brown fumes with an intensely irritating odour. Specific gravity, 2.9 to 3.0; boiling-point, 63°. It should be free from chlorine and iodine. Soluble in water (1 in 30 by weight), readily soluble in alcohol, ether, chloroform, carbon disulphide, and glycerin, with gradual decomposition of the solvents. It should combine with solution of potassium hydroxide to form a permanently clear liquid without the separation of oily drops (absence of organic bromine compounds).

Bromine closely resembles chlorine in its properties (see Aqua Chlori), and acts by oxidation as a powerful disinfectant. It is given in the form of brominol (Bromipin), a pale yellow liquid containing 10 or 33 per cent. of bromine in combination with sesame oil, and used as a substitute for the metallic bromides. Externally, bromine has been used as a lotion for chronic ulcers in the proportion of 30 minims to 1 pint of water, and in stronger solutions as a corrosive, for application to the os uteri, etc. The antidotes for bromine are white of egg, enema of starch, sodium bicarbonate, and very dilute solution of ammonia.

*NOTES.*—Bromine is used for making sodium hypobromite solution for the determination of urea in urine analysis, and for this purpose is some times employed in the form of glass capsules containing 2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm), which are dropped into the sodium hydroxide solution and broken beneath the surface of the fluid, or an equivalent quantity of Liquor Bromi Fortis may be used (see Liquor Sodii Hypobromitis). Solution of bromine is prepared by adding 1 of bromine to 150 of distilled water, and shaking frequently.

## BRYONIAE RADIX.

BRYONY ROOT.

Bryony root is obtained from *Bryonia dioica*, Jacq. (N.O. Cucurbitaceae), a climbing plant, with perennial root, common in the



South of England. The root is collected in the autumn, and used both in the fresh and dried states.

The root is usually of large size (5 to 10 centimetres in diameter) and nearly cylindrical shape, tapering gradually towards the tip. It is usually simple, but sometimes branches into two. The fresh root is externally of a yellowish-white colour, and marked with transverse corky ridges, which give to the root a wrinkled appearance; internally it is whitish and fleshy, and the broken surface exudes a juice, which appears milky from the presence of numerous minute starch grains. The transverse section exhibits a narrow bark, separated by a fine line from the large fleshy wood. The wood contains small groups of vessels, radially arranged, and extending from the centre to the bark. The odour of the fresh root is unpleasant, the taste nauseous, bitter, and acrid. The dried root occurs in rounded slices, obtained by cutting the root transversely. The slices vary in size, averaging about 5 centimetres in diameter. They have a thin yellowish-grey cork, and a whitish wood, marked with concentric rings, and radially arranged vessels. The dried root has a bitter, acrid taste.

The chief constituents of bryony root are a bitter white glucoside named bryonin, and an acid resinous substance named bryoresin; on hydrolysis, bryonin yields glucose and a yellowish amorphous resin named bryogenin. Other constituents of the drug are starch, sugar, and gum.

The glucoside and resin in bryony root have a very similar action to the resinous constituents of jalap and colocynth, large doses of the tincture being cathartic and diuretic. Small doses are given to relieve the pain and cough of pleurisy. An infusion (1 in 10) has been recommended as a styptic. In cases of poisoning the stomach must be evacuated and demulcent drinks given, followed by alcoholic stimulants. The body temperature must be maintained by the use of blankets and hot bottles.

## BUCHU FOLIA.

### BUCHU LEAVES.

*Synonyms.*—Buchu; Short Buchu; Round Buchu.

Buchu leaves are obtained from *Barosma betulina*, Bart. and Wendl (N.O. Rutaceæ), a small shrubby plant indigenous to Cape Colony. The leaves are collected while the plant is flowering and fruiting, then dried and exported.

The leaves vary from 12 to 20 millimetres in length; they have a characteristic rhomboid-obovate outline, a sharply denticulate margin, almost glabrous surface, and blunt strongly recurved apex. Numerous oil glands are distributed throughout the lamina of the leaf, especially near the indentations in the margin. The odour is strong and characteristic, more marked when the leaves are crushed, and the taste is strong and aromatic. When fresh, the leaves have a bright pale green colour, but this changes to yellow on keeping.

Buchu leaves contain about 1·3 to 2 per cent. of volatile oil which, on cooling, deposits about 30 per cent. of diosphenol,  $C_{10}H_{16}O_2$ , a crystalline and optically inactive substance, boiling at  $232^\circ$  with partial decomposition. Other constituents of the oil are a hydrocarbon,  $C_{10}H_{18}$ , boiling at  $174^\circ$  to  $176^\circ$ , and a ketone,  $C_{10}H_{18}O$ , the latter possessing a pure peppermint-like odour, and probably identical with lævogryate menthone. The drug also contains mucilage and yellow spherocrystals of hesperidin. It yields about 4 per cent. of ash on incineration.

Buchu is antiseptic and slightly diuretic; it is used principally in inflammatory conditions of the urinary organs as cystitis and gonorrhœa. The drug is used as infusion, tincture, or liquid extract. The infusion contains the demulcent mucilage of the freshly broken leaves. The liquid extract is a more concentrated preparation than the tincture, and is to be preferred when a small proportion only of alcohol is desired. Buchu is prescribed with diuretics and genito-urinary antiseptics, notably the benzoates, formamine, cubebs, etc.

NOTES.—In addition to the official "short" or "round" buchu, two other varieties of the drug are imported, viz., "long" buchu and "crenate" buchu. Long buchu leaves (*B. serratifolia*, Willd.) may be distinguished by their greater length (2·5 to 3·0 centimetres), linear lanceolate shape, serrate margin, and truncate apex; they contain numerous oil glands, one being situated in the truncate apex. The constituents are similar to those of the official variety with the exception that they contain no diosphenol. As this is considered to be an important constituent long buchu leaves have been excluded from the Pharmacopœia. Crenate buchu leaves (*B. crenulata*, Hook.) are rather broader than the long, varying in outline from lanceolate to oval-oblong. They yield about 1·6 per cent. of volatile oil, which, like that of short buchu, contains diosphenol. Leaves of other species of *Barosma* are occasionally imported and offered as buchu, but the official variety is easily distinguished by the size and characteristic shape of the leaves.

## BUTEÆ GUMMI.

### BUTEA GUM.

Butea gum is a dried astringent juice obtained from incisions in the stem of *Butea frondosa*, Roxb. (N.O. Leguminosæ), a tree which grows in India.

The gum occurs in commerce in small, irregular, angular fragments, to one side of which dull, buff-coloured portions of the cork and cortex of the stem sometimes adhere. When fresh the gum is brittle, vitreous, ruby-red in colour, and transparent in small fragments; but on keeping it becomes tougher, dull, opaque, and nearly black. It is partially soluble in water, and yields about 40 per cent. to alcohol. It is readily reduced to a reddish powder, and has an astringent taste. For use in medicine the drug should be free from adhering portions of the stem.

The chief constituents of butea gum are about 15 to 62 per cent. of tannin, 3·5 to 11 per cent. of other soluble matters, while the insoluble matter may vary from 10 to 46 per cent.

Butea gum possesses astringent properties, and may be used for similar purposes to kino.

NOTE.—Butea gum is sanctioned for use in India and the Eastern Colonies as a substitute for East Indian, Malabar, or Madras kino, in making official preparations for which kino is directed to be used.

## BUTEÆ SEMINA.

### BUTEA SEEDS.

Butea seeds are the product of *Butea frondosa*, Roxb. (N.O. Leguminosæ), a tree indigenous to India.

The seeds are flat and reniform in shape, from 25 to 38 millimetres long, 16 to 25 millimetres wide, and 1.5 to 2 millimetres thick. The seed-coat is reddish-brown in colour, glossy, and wrinkled, and encloses two large, leafy, yellowish cotyledons. The hilum is conspicuous, and situated near the middle of the concave edge of the seed. The odour is faint, and the taste slightly acrid and bitter.

The chief constituents of butea seeds are about 18 per cent. of fat, 19 per cent. of albuminoid substances, and 6 per cent. of glucose. The seeds yield, on incineration, about 5 per cent. of ash.

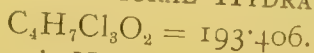
Butea seeds possess aperient and anthelmintic properties, and are said to act as a rubefacient when pounded with lemon-juice and applied to the skin.

Dose.—6 to 12 decigrams (<sup>10</sup>5 to 20 grains).

NOTE.—Butea seeds are used in India and the Eastern Colonies as an equivalent of santonin.

## BUTYL-CHLORAL HYDRAS.

### BUTYL-CHLORAL HYDRATE.



Synonyms.—Croton-Chloral Hydrate; Trichlor-Butylidene Glycol.

Butyl-chloral hydrate,  $\text{CH}_3\text{CHClCCl}_2\text{CH}(\text{OH})_2$ , may be obtained by passing dry chlorine into aldehyde (or, better, paraldehyde), cooled to about  $-9.5^\circ$ , until the aldehyde is saturated, and then continuing the current and gradually increasing the temperature to about  $100^\circ$ . The product is washed with sulphuric acid and submitted to fractional distillation, collecting the portion distilling at  $163^\circ$  to  $165^\circ$ . This is mixed with one-ninth its weight of water, and, when the mass has crystallised, it is recrystallised from boiling water.

It occurs in white opaque, scaly crystals, with a pungent, but not acrid odour, and a nauseous bitterish taste. Melting-point about  $77.8^\circ$ , forming a clear liquid which solidifies at about  $71.1^\circ$ . Soluble in water (1 in 44), glycerin (1 in 1 by weight), alcohol (5 in 3), chloroform (1 in 20), olive oil (1 in 20), and ether (1 in 2). Neutral or



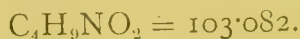
faintly acid to litmus. It should be free from chloral hydrate, and should give no precipitate with solution of silver nitrate. From a strong solution in alcohol it is precipitated by the gradual addition of water in the form of globules, consisting of butyl-chloral alcoholate. When gently warmed with concentrated sulphuric acid no discoloration should result.

Butyl-chloral hydrate resembles chloral hydrate in its action, but is a weaker hypnotic. It was formerly supposed to have a specific effect on the fifth cranial nerve, but that supposition was incorrect. Butyl-chloral hydrate may be given in cachets or freshly made pills, massed with gum acacia and syrup or glycerin of tragacanth; also as Syrupus Butyl-Chloral Hydratis, or in mixtures by first dissolving it in glycerin and diluting. It should not be dissolved in alcohol, as the two substances form an alcoholate which is insoluble in water. It is incompatible with alkalies, alkaloids, and antipyrine. In cases of poisoning the same procedure should be followed as for chloral hydrate.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

### BUTYL NITRIS.

BUTYL NITRITE.



*Synonym*.—Isobutyl Nitrite.

Butyl nitrite,  $(\text{CH}_3)_2\text{CHCH}_2\text{ONO}$ , may be obtained by gradually adding sulphuric acid to isobutyl alcohol and pouring the mixture when cold, in small quantities at a time, into an aqueous solution of sodium nitrite (1 in 3), the whole being kept cool. The isobutyl nitrite which separates and floats on the surface of the liquid is drawn off, washed with an aqueous solution of potassium carbonate, and finally dried by digestion with fused potassium carbonate.

It occurs as a yellowish liquid with a characteristic odour, somewhat fragrant, and causing, when inhaled, flushing of the face and other disturbances. Soluble in alcohol. Boiling-point,  $67^\circ$  to  $68^\circ$ ; specific gravity, 0.875. It is liable to become acid on keeping if moisture be present.

Butyl nitrite is employed for the same purposes and in the same manner as amyl nitrite. Its action upon blood pressure and pulse rate is very prompt. Glass capsules are prepared for inhalation, containing 18 centimils (3 minims) in each.

*Dose*.—1 to 3 decimils (2 to 5 minims), by inhalation.

### CADMII IODIDUM.

CADMIUM IODIDE.



Cadmium iodide,  $\text{CdI}_2$ , may be prepared by the interaction of metallic cadmium and iodine, or by dissolving potassium iodide, 20,

cadmium sulphate, 15, in water, evaporating the solution to dryness, extracting the residue with warm absolute alcohol, filtering, and crystallising.

It occurs as nearly colourless, shining, crystalline flakes, odourless, and having a nauseous metallic taste. Very soluble in cold water (1 in 1), in boiling water (1 in 0.75), readily soluble in alcohol. The aqueous solution has an acid reaction. Heated to about 310° it melts, forming an amber-coloured liquid, and, at a dull red heat, decomposes with evolution of iodine vapours.

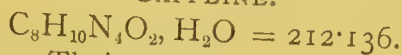
Given internally, cadmium salts act similarly to those of zinc, but they are rarely used. For external use, an ointment is prepared for application with friction to enlarged joints, scrofulous glands, and chilblains.

*Dose.*—5 to 10 milligrams ( $\frac{1}{12}$  to  $\frac{1}{8}$  grain).

*NOTE.*—Solution of cadmium iodide is prepared by dissolving 5 of the salt in sufficient distilled water to produce 100 by volume.

## CAFFEINA.

### CAFFEINE.



*Synonyms.*—Coffeine; Theine; Guaranine; Trimethyl-xanthine; Methyl-theobromine.

Caffeine, or trimethyl-xanthine,  $\text{C}_8\text{H}(\text{CH}_3)_3\text{N}_4\text{O}_2, \text{H}_2\text{O}$ , is an alkaloid contained in the seeds of *Coffea arabica*, Linn. (N.O. Rubiaceæ), in the leaves of *Camellia Thea*, Link. (N.O. Ternstrœmiaceæ), in *Paullinia Cupana*, H.B. and K. (N.O. Sapindaceæ), and in a few other plants. It may be obtained by treating strong decoctions with lead acetate, which removes tannin, colouring matter, etc., removing excess of lead by means of hydrogen sulphide, filtering, concentrating, and crystallising. Commercially it is prepared chiefly from tea dust or sweepings. It may be obtained synthetically by heating theobromine-silver with methyl iodide. It contains one molecule of water of crystallisation, if crystallised from water; but it is anhydrous when crystallised from alcohol, ether, or chloroform. As found in commerce it usually contains about 7 per cent. of water of crystallisation. The anhydrous substance contains 28.90 per cent. of nitrogen.

It occurs in the form of white, flexible, glistening, silky needles, usually matted together, odourless, and having a bitter taste. Soluble in cold water (1 in 68), boiling water (1 in 1), alcohol (1 in 40), chloroform (1 in 7), ether (1 in 400), and benzene; its solubility in water is much increased by the addition of sodium benzoate or salicylate. At ordinary temperatures it gradually loses water of crystallisation, and it becomes anhydrous at 100°. Exposure over sulphuric acid also dehydrates the hydrous alkaloid. Heated to 120° it constantly loses weight owing to slow volatilisation. It sublimes at 178° and melts at 237° without decomposition. On ignition it burns with a sooty flame, and leaves no residue. Caffeine is a very feeble

bise, its salts being decomposed by water. The aqueous solution is neutral to litmus paper. An acidulated aqueous solution yields the whole of its caffeine to benzene, chloroform, or amyl alcohol when any of those solvents is shaken with it. It dissolves in sulphuric acid or nitric acid, without colouration (absence of organic impurities). When moistened with strong nitric acid, or dissolved in chlorine water and evaporated on a water-bath, it leaves a reddish-yellow residue which, in contact with ammonia in solution or vapour, becomes purple from formation of murexin, the ammonia salt of purpuric acid. With potassium hydroxide the colour is discharged. The aqueous solution is not precipitated by Mayer's solution (distinction from other alkaloids except ~~morphine~~). With solution of silver nitrate it gives a granular crystalline precipitate; with mercuric chloride, long needles soluble in hydrochloric acid; with tannic acid, a white precipitate soluble in excess. The aqueous solution containing a large excess of a mineral acid is precipitated quantitatively by solution of iodine in potassium iodide. The salts of the mineral acids have an acid reaction on litmus, and are decomposed by water or alcohol.

Caffeine exerts three important actions (1) on the central nervous system, (2) on muscle, including cardiac, and (3) on the kidney. The action on the central nervous system is mainly on that part of the brain connected with psychical functions. It produces a condition of wakefulness and increased mental activity. The interpretation of sensory impressions is more perfect and correct, and thought becomes clearer and quicker. With larger doses of caffeine the action extends from the psychical areas to the motor area and to the cord, and the patient becomes at first restless and noisy, and later may show convulsive movements. Caffeine facilitates the performance of all forms of physical work, and actually increases the total work which can be obtained from a muscle. On the normal man, however, it is impossible to say how much of the action on the muscle is central and how much peripheral. But, as fatigue shows itself first by an action on the centre, it is probable that the action of caffeine in diminishing fatigue is mainly central. Caffeine accelerates the pulse and slightly raises blood-pressure. It has no action in any way resembling digitalis; by increasing the irritability of cardiac muscle its prolonged use rather tends to fatigue than to rest the heart. Caffeine and its allies form a very important group of diuretics. The urine is generally of a lower specific gravity than normal, since it contains a lesser proportion of salt and urea; but the total excretion of solids both as regards urea, uric acid, and salts is increased. Caffeine, by exciting the medulla, produces an initial vaso-constriction of the kidneys, which tends at first to retard the flow of urine. So in recent years other drugs have been introduced, allies of caffeine which act like it on the kidneys, but are without the stimulant action on the brain. Theobromine is such a drug. Caffeine has recently been recommended as an antidote to nicotine. A curious property it possesses is that of combining with quinine



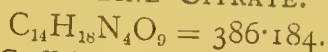
hydrochloride to form a substance named "basicine," the properties of which differ materially from those of either of its constituents; this compound is soluble in water (1 in 1), and melts at 125°. The pure alkaloid is preferred to the citrate for the preparation of powders, cachets, tablets, and pills, especially if mixed with other ingredients. Pills are best prepared with glucose and a little tragacanth. Caffeine is a constituent of many proprietary headache tablets and cachets. It is usually combined with acetanilide, phenacetin, or antipyrine (see *Pulvis Acetanilidi Compositus*). For hypodermic injection, caffeine sodio-benzoate or sodio-salicylate is commonly employed.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTES.*—Caffeine (methyl-theobromine) is trimethylxanthine and, like xanthine, the dimethylxanthines (theophylline and theobromine), and other members of the same group, may be prepared by synthesis, with urea as a starting point. On heating urea and amido-acetic acid together, uric acid results; oxidising agents convert uric acid into alloxan, and from dimethyl-alloxan it is possible to produce trimethyl uric acid (hydroxycaffeine), from which caffeine can be formed through chlorocaffeine.

## CAFFEINÆ CITRAS.

### CAFFEINE CITRATE.



*Synonyms.*—Caffeina Citrata; Citrated Caffeine.

Caffeine citrate,  $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2 \cdot \text{C}_6\text{H}_8\text{O}_7$ , may be prepared by dissolving 50 parts of citric acid in 100 parts of hot water and dissolving 50 parts of caffeine in the hot solution, evaporating on a water-bath to dryness, with constant stirring towards the end of the operation, and powdering the residue. A simpler method of preparation is to mix the powdered citric acid with the caffeine, damp the mixture with distilled water, and dry. The caffeine citrate is an unstable compound, containing 50.27 per cent. of anhydrous caffeine.

It occurs as a white powder, odourless, having a bitter and acid taste, and an acid reaction. Soluble in water (1 in 32), in alcohol (1 in 22), and in a mixture of 2 parts of chloroform and 1 part of alcohol (1 in 10). Heated in air it is charred and then burnt, leaving a mere trace of ash. The cold saturated solution in absolute alcohol reddens blue litmus paper only slightly (absence of free citric acid). With 3 parts of water it forms a stiff paste which, if gently warmed becomes a clear solution; on again cooling it forms an almost solid mass of acicular crystals of caffeine. When shaken with chloroform it should yield no caffeine to the solvent. On heating 25 centigrams with 5 mils of sulphuric acid in a porcelain dish on a water-bath for fifteen minutes a lemon-yellow colour and not brown or black should be produced (absence of tartaric acid). If 1 gramme be dissolved in 20 mils of boiling water, the solution made alkaline with excess of sodium hydroxide, and after cooling extracted successively with 15, 10 and 10 mils of chloroform, the combined chloroform extracts when evaporated and dried at 100° should leave a residue weighing

0.5 gramme. The citric acid may be titrated with standard alkali, using phenolphthalein as indicator. The presence of the very weak base caffeine does not interfere. The salt should afford the reactions characteristic of caffeine and citrates and should be free from chlorides, sulphates, calcium, or lead.

Caffeine citrate is more stable in concentrated solution than the pure alkaloid, but is dissociated on dilution. Its solutions contain free citric acid, and therefore effervesce with alkaline carbonates; it should be prescribed with acids rather than with alkalies. For combination in mixtures with sodium benzoate or salicylate, sodium nitrite, or antipyrine, pure caffeine should be used. Caffeinæ Citras Effervescens is a convenient form in which to use this unstable salt, or it may be given enclosed in a cachet.

*Dose.*—1 to 6 decigrams (2 to 10 grains).

### CAFFEINÆ CITRAS EFFERVESCENS.

EFFERVESCENT CAFFEINE CITRATE.

*Synonym.*—Caffeina Citrata Effervescens.

Caffeine Citrate	...	...	...	...	4.00
Sodium Bicarbonate, in powder	...	...	...	...	51.00
Tartaric Acid, in powder	...	...	...	...	27.00
Citric Acid, in powder	...	...	...	...	18.00
Refined Sugar, in powder	...	...	...	...	14.00

Mix the acids with the caffeine citrate, and the sodium bicarbonate with the sugar, then thoroughly mix the one with the other, and granulate the resulting mixture by stirring in a pan heated to between 93° and 104°; pass through sieves of a suitable size, and dry at a temperature not exceeding 54°. The product should weigh about 100.

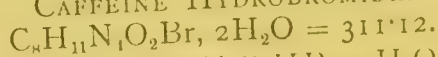
This method of preparing the granules yields satisfactory results, but the following alternative method has also been suggested:—Mix the sodium bicarbonate, the sugar, and the medicament, pass the mixture through a No. 20 to No. 30 incorrodible sieve, subject the mixed acids to the same process, and thoroughly mix the two sifted powders. Place the mixed powders in layers on a suitable dish, pan, or glass tray, heated to 75° to 85°, if required, but not exceeding the higher temperature. When the mass, after being suitably kneaded and compressed, has assumed a uniformly plastic condition, suitable for granulation, rub it through a No. 5 to No. 10 incorrodible sieve, according to the size of granule desired, and dry the granules at a temperature not exceeding 50°.

*Dose.*—4 to 8 grammes (60 to 120 grains).

*NOTE.*—Caffeina Citrata Effervescens, U.S.P., contains no sugar; it is prepared with 4 of caffeine citrate, 57 of dried sodium bicarbonate, 30 of dried tartaric acid, and 19½ of citric acid.

### CAFFEINÆ HYDROBROMIDUM.

CAFFEINE HYDROBROMIDE.



Caffeine hydrobromide,  $C_8H_{10}N_4O_2HBr, 2H_2O$ , may be prepared

by dissolving caffeine in excess of warmed dilute hydrobromic acid, crystallising by careful evaporation, draining the resulting crystals on blotting-paper, and finally drying. The salt contains 62.40 per cent. of anhydrous, or 68.19 per cent. of hydrous, caffeine.

It occurs in the form of large, transparent, colourless crystals, becoming coloured on exposure to the air. Soluble in water (1 in 50), with decomposition into hydrobromic acid and caffeine; it is similarly decomposed by alcohol. On exposure to the air it loses part of its water of crystallisation. At 100° it becomes anhydrous, losing at the same time part of its hydrobromic acid. At 110° all the hydrobromic acid is driven off and pure caffeine remains.

Caffeine hydrobromide is employed principally in migraine and nervous headaches. It is prescribed in the form of effervescent salt, in mixtures with potassium or sodium bromide, or enclosed in a cachet.

*Dose.*—6 to 25 centigrams (1 to 4 grains).

### CAFFEINÆ HYDROBROMIDUM EFFERVESCENS.

EFFERVESCENT CAFFEINE HYDROBROMIDE.

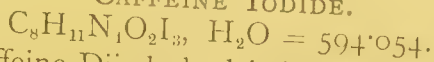
Caffeine Hydrobromide, in powder	...	...	4.00
Sodium Bicarbonate, in powder	...	...	46.00
Tartaric Acid, in powder	...	...	24.00
Citric Acid, in powder	...	...	18.00
Refined Sugar, in powder	...	...	18.00

Mix and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—4 to 8 grammes (60 to 120 grains).

### CAFFEINÆ IODIDUM.

CAFFEINE IODIDE.



*Synonym.*—Caffeine Diiodo-hydriodide; Caffeine Tri-iodide.

Caffeine iodide or diiodo-hydriodide,  $\text{C}_8\text{H}_{10}\text{N}_1\text{O}_2\text{HII}_{33} \cdot \text{H}_2\text{O}$ , may be prepared by dissolving caffeine in weak alcohol strongly acidified with hydriodic acid containing free iodine, and setting aside for some days, exposed to the light. The resulting crystals may be washed with very weak spirit containing a drop or two of coloured hydriodic acid, and then dried *in vacuo*, or in a current of dry air.

It occurs in the form of prismatic crystals, having a metallic lustre, steel-blue by reflected light, red by transmitted light; readily decomposed in moist air. Soluble in water with slow decomposition, iodine being liberated; also soluble in alcohol, forming a brown solution. At the temperature of a water-bath it is decomposed. By treatment with water and carbon disulphide, or by boiling with water alone, the loosely combined iodine may be removed, and the colourless liquid, on evaporation, yields crystals of the ordinary hydriodide. It does not colour chloroform unless water be present. It resembles Herapath crystals in its polarising action on light.



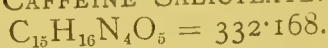
Caffeine iodide may be regarded as normal caffeine hydriodide with two loosely combined atoms of iodine. It has been given in gout and rheumatism, and is said to alleviate rapidly the pain. It is best dispensed in pills, massed with powdered acacia and glucose. As the compound readily liberates iodine, it is not suitable for administration in the form of mixtures.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

NOTE. —Caffeine iodide should be kept in well-stoppered bottles protected from the light.

### CAFFEINÆ SALICYLAS.

CAFFEINE SALICYLATE.



Caffeine salicylate,  $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2\text{HC}_7\text{H}_5\text{O}_3$ , may be prepared by dissolving caffeine in an aqueous solution of salicylic acid and evaporating the solution to dryness.

It occurs as a white crystalline powder. Soluble in water and in alcohol.

Caffeine salicylate has the properties of other salts of caffeine, but is particularly employed in migraine associated with gout and rheumatism.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### CAFFEINÆ SODIO-BENZOAS.

CAFFEINE SODIO-BENZOATE.

Caffeine sodio-benzoate may be prepared by dissolving 50 parts of caffeine and 59 parts of sodium benzoate in 200 parts of water, filtering the solution and evaporating to dryness. It contains about 45 per cent. of caffeine.

It occurs in the form of a colourless, amorphous, or amorpho-crystalline powder, or as a granular white mass, odourless, and having a bitter, aromatic taste. Soluble in water (1 in 2), and in alcohol (1 in 30). Chloroform, when shaken with the powder, extracts all the caffeine. The aqueous solution has a neutral reaction. Cautiously heated in a test-tube it emits white vapours of caffeine, which condense on the cooler part of the tube in a fine white crystalline state. Ignited, it leaves a white residue easily soluble in water, and this solution should be free from the heavy metals and sulphates, and from more than traces of chlorides. The aqueous solution (5 per cent.) gives with hydrochloric acid a copious crystalline precipitation of benzoic acid, easily soluble in ether. It also gives with ferric chloride a reddish-yellow precipitate. On dissolving 1 gramme in 20 mls of water, making alkaline with solution of sodium hydroxide, and shaking twice with 15 mls of chloroform for five minutes, the mixed chloroformic solutions on evaporation (drying at 100°) should leave 0.43 to 0.46 gramme of anhydrous caffeine. Or the caffeine may be determined by repeatedly boiling the powder with chloroform, filtering, and evaporating.

Caffeine sodio-benzoate is used hypodermically on account of its ready solubility. Therapeutically, caffeine is the active principle of the compound, the sodium benzoate being of small consequence. A solution of 1 part in 2 parts of sterilised distilled water may be prepared for hypodermic injection as a cardiac and respiratory stimulant or as a diuretic. Such a solution is stable and very active.

*Dose.*—1 to 10 decigrams (2 to 15 grains).

### CAFFEINÆ SODIO-SALICYLAS.

#### CAFFEINE SODIO-SALICYLATE.

Caffeine sodio-salicylate may be prepared by dissolving caffeine, 50, in a solution of sodium salicylate, 55, in distilled water, 200, evaporating to dryness and powdering the residue, or the two powders may be triturated with sufficient alcohol to form a smooth paste, the product dried by exposure in a moderately warm place, and finally powdered. It contains about 50 per cent. of caffeine.

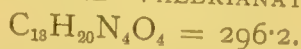
It occurs in the form of a white amorphous powder, or white granular mass, odourless, and having a sweetish bitter taste. Soluble in water (1 in 1), and in alcohol (1 in 28); the aqueous solution (20 per cent.) should be colourless, becoming only very faintly red and acid after standing for a time. Heated in a test-tube the salt evolves white vapours having the odour of phenol. A strong aqueous solution gives a crystalline precipitate of salicylic acid on the addition of hydrochloric acid; a diluted solution gives a violet colouration with ferric chloride (distinction from caffeine sodio-benzoate). One decigram should dissolve in 1 mil of sulphuric acid without effervescence or colour. If 0.5 gramme be boiled with successive portions of 5 mils of chloroform, the united clear solutions should yield on evaporation at least 0.2 gramme of dry caffeine; or it may be determined in a similar way to that described under Caffeinæ Sodio-benzoas.

Caffeine sodio-salicylate is employed hypodermically in place of caffeine, being much more soluble than the pure alkaloid. Solutions containing 1 part in 2 or more of sterilised distilled water are used as a cardiac and respiratory stimulant.

*Dose.*—1 to 10 decigrams (2 to 15 grains).

### CAFFEINÆ VALERIANAS.

#### CAFFEINE VALERIANATE.



Caffeine valerianate,  $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2\text{C}_5\text{H}_{10}\text{O}_2$ , may be obtained, with difficulty, by mixing powdered anhydrous caffeine with anhydrous valerianic acid so as to form a thick paste, allowing the mixture to stand for one or two days in a closed vessel at a moderate heat, and then pressing the magma repeatedly between porous plates.

Commercially, however, it is generally a mixture of caffeine and valerianic acid in varying proportions, the best preparation of the kind being a combination of the two anhydrous substances, in the proportion of 4 and 1 respectively. It contains, theoretically, 34.45 per cent. of valerianic acid.

It occurs in the form of white crystals or powder having a strong odour of valerian. Soluble in alcohol, with decomposition. The salt is very unstable and very easily decomposed, losing part of its valerianic acid even on drying.

Caffeine valerianate has the properties of other salts of caffeine, but is used especially in hysterical conditions to relieve headache. It is best dispensed in a pill massed with syrup of glucose.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

### CALAMINA FACTITIA.

#### ARTIFICIAL CALAMINE.

Zinc Sulphate	...	...	...	...	56.00
Sodium Carbonate	...	...	...	...	58.00
Strong Solution of Ferric Chloride	...	...	...	...	1.00
Distilled Water, a sufficient quantity.					

Dissolve the zinc sulphate and the sodium carbonate each in 320 of distilled water, add the strong solution of ferric chloride to the solution of zinc sulphate, then add the solution of sodium carbonate, and shake well. Collect the precipitate on a calico filter, and wash with boiling distilled water until the washings are free from sulphates. Heat the precipitate in a crucible, at a dull red heat, until a portion taken from the crucible ceases to effervesce when treated with an acid. When cold, transfer the contents of the crucible to a mortar, and grind to an impalpable powder.

The properties of artificial calamine resemble those of prepared calamine. It is more constant in colour, and the tint may be modified as described under Calamina Præparata.

### CALAMINA PRÆPARATA.

#### PREPARED CALAMINE.

Prepared calamine is native zinc carbonate, containing more or less zinc silicate, calcined at a moderate temperature, and freed from gritty particles by elutriation.

It occurs as a heavy brownish, yellowish-grey or pinkish powder, free from grittiness. It should be free from barium sulphate, and almost entirely soluble with effervescence in acids (limit of silicate).

Calamine is a common constituent of dusting powders and face lotions, as a mild astringent for roughness and redness of the skin and irritable eczematous conditions. For dispensing purposes the desiderata in specimens of calamine are freedom from coarse particles and suitability and constancy of colour-tint—a pale flesh.

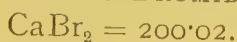


In preparing calamine lotions the powder should be carefully elutriated with the menstruum, and coarse heavy particles rejected. Ceratum Calaminæ was formerly much used; Linimentum Calaminæ is a suspension of calamine with lime-olive oil soap. A *rachel* tint is sometimes given to pale calamine by means of powdered turmeric or yellow ochre, a reddish tint by jewellers' rouge or Armenian bole, and a pink by carmine.

NOTES.—The commercial varieties of calamine consist often of zinc carbonate and oxide in varying proportions, calcium carbonate, barium sulphate, and similar substances coloured by ferric oxide and occasionally by fuchsine. In the latter case the colouring matter is soluble, and the use of the dye is therefore objectionable.

### CALCII BROMIDUM.

CALCIUM BROMIDE.



Calcium bromide,  $\text{CaBr}_2$ , may be prepared by neutralising calcium carbonate with hydrobromic acid, or by the action of calcium hydroxide on iron bromide.

A white, or nearly white, very deliquescent granular salt, odourless, and having a sharp saline and bitter taste. Very soluble in water (10 in 3) and in alcohol (5 in 3); neutral to litmus; melts at a red heat, giving off bromine. It should be entirely soluble in water, and free from iodides, bromides, bromates, nitrates, ammonia, and metallic impurities generally. When recently dried it should not contain more than 3 per cent. of water. *Chloride*

Calcium bromide has been recommended in epilepsy and chorea as a substitute for potassium bromide. It is best dispensed in solution, being too deliquescent for use in powders or cachets. This salt is incompatible with alkaline carbonates.

*Dose.*— $\frac{1}{2}$  to 2 grammes (8 to 30 grains).

NOTE.—Calcium bromide should be kept in well-stoppered bottles.

### CALCII CARBONAS PRÆCIPITATUS.

PRECIPITATED CALCIUM CARBONATE.



*Synonym.*—Precipitated Chalk.

Calcium carbonate,  $\text{CaCO}_3$ , is obtained by the interaction of calcium chloride and sodium carbonate.

It occurs as a fine white powder, composed of microscopic crystals, odourless, tasteless; insoluble in water or alcohol, soluble with effervescence in diluted mineral acids and some organic acids. It should be free from iron, aluminium, phosphates, and sulphates, and contain not more than traces of magnesium or chlorides.

Calcium carbonate, applied externally, is antacid and mildly astringent, forming a soothing application to burns when made into

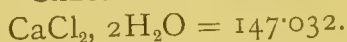
a cream with oil. For internal use the amorphous carbonate is often preferred (see *Creta Preparata*). Grades of different density are met with in pharmacy. The powder should be free from all grittiness, and on elutriation should show no coarse particles. It is chiefly used as a basis for tooth powders, its micro-crystalline character conferring advantages over native calcium carbonate for this purpose. A siliceous basis is, however, better suited to tooth powders containing boric acid and carbolic acid, as these combine with calcium carbonate. As an antacid it is prescribed in cachets or powders with bismuth carbonate or charcoal; also in lozenge form with bismuth (see *Trochiscus Bismuthi Compositus*), or with magnesium carbonate and sodium chloride (see *Trochiscus Antacidus*).

*Dose*.— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

NOTES.—Calcium carbonate always contains some occluded sodium carbonate and chloride. For analytical use a purer form may be prepared by precipitating with ammonium carbonate or by treating pure calcium hydrate with ammonium carbonate and heating the product.

## CALCII CHLORIDUM.

CALCIUM CHLORIDE.



Calcium chloride,  $\text{CaCl}_2, 2\text{H}_2\text{O}$ , may be formed by the interaction of calcium carbonate and hydrochloric acid, the product being carefully dried at a temperature not exceeding  $200^\circ$ , so as to contain about 24 per cent. of water. The substance represented by the official formula,  $\text{CaCl}_2, 2\text{H}_2\text{O}$ , can only be obtained with difficulty by crystallisation from solutions of a certain density, and if dried at  $200^\circ$  will contain less water than corresponds to the formula given. The most definite and convenient form is the anhydrous salt. Other varieties occurring in commerce are the crystals,  $\text{CaCl}_2, 6\text{H}_2\text{O}$ , and fused calcium chloride, which contains variable proportions of water. A crude form of calcium chloride in lumps is used for making brine in ice machines on account of the low freezing-point of its strong solution.

It occurs in hard, white, very deliquescent masses, having a warm, saline, bitterish, sharp taste. Soluble in water (1 in 1) and alcohol (1 in 3). It should be free from iron, aluminium, hypochlorites, and carbonates, and not contain more than traces of magnesium.

The chloride is the form in which calcium is generally given to obtain its specific effects. Calcium salts are all absorbed very slowly; their absorption is facilitated by fats, but by far the greater part passes through the intestines unabsorbed. To ensure absorption 1 or 2 grains well diluted with water may be injected into muscle, but for this mode of use one of the less irritant salts, such as the lactate, is preferred. Calcium facilitates the clotting of blood in a manner characteristic of no other drug, and is therefore

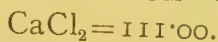
much used in the treatment of internal hæmorrhage. In many cases of chilblain, urticaria and chronic ulceration, the administration of calcium produces a marvellous effect. It is also given for the tuberculous glands of children, but with doubtful success. For other actions of calcium see under *Calcii Phosphas*. This very deliquescent salt is best dispensed in solution, its rather nauseous taste being covered with liquorice or simple elixir. Pills are sometimes prepared with Canada balsam, and preserved from the air by enclosure in a bottle. Tablets of calcium chloride may be prepared, containing 30 centigrams (5 grains) in each. Calcium chloride is incompatible with carbonates, phosphates, tartrates, and sulphates. A solution containing 1 part in 2 of the freshly prepared salt may be kept for use in dispensing.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

*Notes*.—Calcium chloride should be kept in well-stoppered bottles. Solution of calcium chloride is prepared by dissolving 10 of the fused salt in sufficient distilled water to produce 100 by volume.

### **CALCII CHLORIDUM ANHYDROSUM.**

ANHYDROUS CALCIUM CHLORIDE.



Anhydrous calcium chloride is prepared by fusing the hydrated compound at the lowest possible temperature, and should not contain more than 1 per cent. of water.

It occurs in white, slightly translucent, hard fragments, with a sharp saline taste. It is very deliquescent. Soluble in water (1 in  $1\frac{1}{3}$ ) and alcohol (1 in  $1\frac{1}{2}$ ). It should dissolve in water without residue, be free from iron, aluminium, hypochlorites, and carbonates, and not contain more than traces of magnesium.

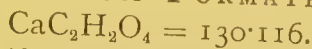
Anhydrous calcium chloride is of more constant composition than the hydrated compound, and may with advantage be substituted for the latter.

*Dose*.—2 to 6 decigrams (3 to 10 grains).

*Note*.—Anhydrous calcium chloride should be kept in well-stoppered bottles.

### **CALCII FORMAS.**

CALCIUM FORMATE.



Calcium formate,  $\text{Ca}(\text{COOH})_2$ , is the calcium salt of formic acid, which separates on evaporation of its solution as a glistening crystalline crust, or in large crystals.

It occurs in the form of anhydrous rhombic crystals. Soluble in cold water (1 in 8 to 10), and not much less in hot water, but insoluble in alcohol. Its hot solutions reduce salts of silver and mercury. When heated with sulphuric acid, carbon monoxide is evolved. Heated with calcium benzoate, benzoic aldehyde is formed, together with calcium carbonate.

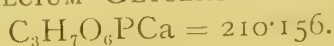


Calcium formate is employed for the "tonic" action of the formic radical upon striped and unstriped muscle (see Sodii Formas) when calcium salts are indicated. It is usually given in association with sodium, potassium, or iron formate, in the form of syrup or elixir (see Elixir Formatum Compositus). It may also be given in solution in mixtures or administered in a cachet. It is incompatible with the alkaline carbonates, phosphates, and sulphates.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

### CALCII GLYCEROPHOSPHAS.

CALCIUM GLYCEROPHOSPHATE.



*Synonym.*—Calcium Glycerylphosphate.

Calcium glycerophosphate,  $\text{CaC}_3\text{H}_7\text{O}_6\text{P}$ , may be prepared by adding glycerophosphoric acid to an excess of milk of lime, filtering when cold and thoroughly washing with water. The filtrate, with added washings, is deprived of excess of lime by means of carbon dioxide, and concentrated to a low bulk, when the separated salt may be collected, or it may be completely precipitated by alcohol, collected, and washed with alcohol. It is an anhydrous salt, and contains 19.04 per cent. of calcium and 14.76 per cent. of phosphorus.

It occurs in tufts of crystalline leaflets or as a powder. Soluble in cold water (about 1 in 22), in boiling water (about 1 in 108); insoluble in alcohol. It should yield nothing to absolute alcohol (absence of glycerin). If a weighed quantity of the salt be dissolved in water, the calcium precipitated as oxalate, and the precipitate converted into oxide by ignition and weighed, the amount obtained should correspond to at least 19 per cent. of calcium.

Calcium glycerophosphate is used to improve the general condition of the nervous system in neurasthenia (see Acidum Glycerophosphoricum). It is an important constituent of the compound syrups, elixir, wine, and glycerin of the glycerophosphates; it may also be dispensed alone or in combination with iron glycerophosphate in cachet form, or as Calcii Glycerophosphas Effervescens. Hypodermic injections contain 25 decigrams (4 grains), dissolved in sterilised distilled water.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

### CALCII GLYCEROPHOSPHAS EFFERVESCENS.

EFFERVESCENT CALCIUM GLYCEROPHOSPHATE.

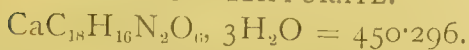
Calcium Glycerophosphate	...	...	...	6.00
Sodium Bicarbonate, in powder	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	24.00
Citric Acid, in powder	...	...	...	18.00
Refined Sugar, in powder	...	...	...	16.00

Mix and granulate the ingredients as directed in the case of Caffeina Citras Effervescens. The product should weigh about 100.

*Dose.*—2 to 4 grammes (30 to 60 grains).

**CALCII HIPPURAS.**

## CALCIUM HIPPURATE.



Calcium hippurate,  $\text{Ca}(\text{C}_9\text{H}_8\text{NO}_3)_2, 3\text{H}_2\text{O}$ , may be prepared by dissolving hippuric acid in milk of lime, filtering, freeing from excess of lime by means of carbon dioxide and allowing to crystallise.

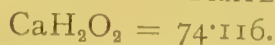
It occurs in the form of white prisms or laminae, or as a white crystalline powder, soluble in cold water (about 1 in 20), in boiling water (1 in 6). Its aqueous solution gives a buff-coloured precipitate with ferric chloride.

Calcium hippurate has been given to patients suffering from gout and urinary calculi, but without benefit. It may be suspended in water in the form of very fine powder or dispensed in cachet form.

*Dose.*— $\frac{1}{2}$  to 2 grammes (5 to 30 grains).

**CALCII HYDRAS.**

## CALCIUM HYDRATE.



*Synonyms.*—Slaked Lime; Calcium Hydroxide.

Calcium hydrate or hydroxide,  $\text{Ca}(\text{OH})_2$ , is prepared by the combination of water and calcium oxide.

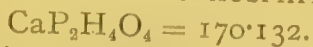
It occurs as a white or nearly white powder, odourless, and having a caustic taste; slightly soluble in cold water (1 in 900), less so in hot water, and more so in aqueous solutions of sugar. The aqueous solution is alkaline and readily absorbs carbon dioxide from the air, hence it should be kept in well-closed vessels. It should contain not more than traces of iron, aluminium, magnesium, sodium, potassium, carbonates, chlorides, phosphates, sulphates, or silica. The hydroxide loses nearly one-fourth its weight of water on ignition, leaving a residue of calcium oxide.

Calcium hydroxide is antacid and astringent, and is used in pharmacy almost solely for the preparation of lime water and of saccharated solution of lime. These are used internally as antacids mixed with milk, and the former in some skin lotions with calamine and zinc oxide, or in such soothing liniments as "carron oil," composed of lime water and linseed oil in equal proportions which is used for burns and scalds.

*NOTES.*—For making lime water, calcium hydroxide should be freshly prepared from calcium oxide derived from marble. Milk of lime is prepared by mixing lime with twice its weight of distilled water.

**CALCII HYPOPHOSPHIS.**

## CALCIUM HYPOPHOSPHITE.



Calcium hypophosphite,  $\text{Ca}(\text{PH}_2\text{O}_2)_2$ , is obtained by heating phosphorus with milk of lime. When the phosphorus has disappeared

the mixture is filtered, evaporated to dryness on a water-bath or allowed to crystallise after strongly concentrating, or it may be precipitated by means of alcohol. The product should contain not less than 98 per cent. of pure calcium hypophosphite.

It occurs as a white powder or lustrous crystals, odourless, and having a nauseous and bitter taste. Soluble in water (1 in 8), in boiling water slightly more so; insoluble in alcohol. On heating, the salt decrepitates, and at 300° spontaneously inflammable gases are evolved. It is a powerful reducing agent, its admixture with certain oxidising bodies being attended with some danger. It should be free from lead, copper, arsenium, iron, aluminium, magnesium, sodium, potassium, carbonates and sulphites, and should not contain more than traces of chlorides, sulphates, phosphates, and phosphites. The official test with potassium permanganate is not very satisfactory. A method recommended is to dissolve about 3 decigrams in 10 mils of water, add 3 mils of a 10 per cent. lead acetate solution, stand for twelve hours, filter, and wash thoroughly, remove the lead and calcium from the filtrate by means of sulphuric acid and alcohol, evaporate, add 5 mils of hydrochloric acid and 1 gramme of potassium chlorate, heat for half an hour, and determine the phosphate in the solution by means of magnesium.

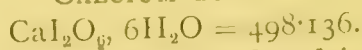
Calcium hypophosphite is given in general debility, especially that of tuberculous disease (see *Acidum Hypophosphorosum*). It is conveniently dispensed as *Syrupus Calcii Hypophosphitis*, containing 1 grain in each fluid drachm. The compound syrups and solutions of the hypophosphites contain the calcium salt amongst others. It is also given in association with malt extract, with or without cod-liver oil; many emulsions of petroleum and cod-liver oil also contain the mixed hypophosphites in solution. The hypophosphites are powerful reducing agents, and their aqueous solutions do not keep well. The sugar of the syrups is a preservative, and these preparations frequently contain a little free hypophosphorous acid added for a similar purpose.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

*NOTE.*—The presence in hypophosphites of carbonates and sulphites, the latter derived from gases absorbed during evaporation of the hypophosphite liquors over coke-fires, may affect the keeping properties of hypophosphite preparations.

## CALCII IODAS.

### CALCIUM IODATE.



Calcium iodate,  $\text{Ca}(\text{IO}_3)_2, 6\text{H}_2\text{O}$ , is found in small amount in sea water. It may be prepared by mixing slowly an alcoholic solution of iodine with an excess of a filtered solution of chlorinated lime, avoiding rise of temperature. Calcium iodate is precipitated and may be crystallised from water. It contains 51 per cent. of iodine and 16 per cent. of available oxygen, and is a powerful antiseptic and deodorant, acting either in alkaline or acid media.

It occurs in the form of white rhombic crystals or as a colourless or yellowish crystalline powder, odourless, tasteless, and somewhat



deliquescent. Soluble in water (1 in 380); nearly insoluble in alcohol. It retains one molecule of water of crystallisation at  $150^{\circ}$ , becoming anhydrous at about  $200^{\circ}$ .

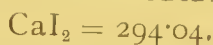
As a substitute for iodoform, calcium iodate is applied in fine powder to cicatrising surfaces, also as 3 per cent. antiseptic gauze. Ointments for use in eczema contain 2 to 4 per cent. with soft paraffin; vaginal douche solutions, 1 in 500; emulsion, 12 grammes (180 grains) of calcium iodate to 30 grammes (1 ounce) of glycerin. Internally, calcium iodate is given in dilute solution as an intestinal antiseptic. It is useful as a gargle and mouth-wash (1 or 2 per cent.).

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

*NOTE.*—Calcium iodate is also known under the trade-name Calcinol.

## CALCII IODIDUM.

CALCIUM IODIDE.



Calcium iodide,  $\text{CaI}_2$ , may be prepared by the action of calcium hydroxide on ferrous iodide, or by neutralising hydriodic acid with calcium hydroxide or carbonate, filtering, evaporating to dryness, and fusing.

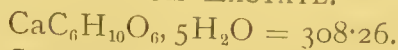
It occurs as a white deliquescent mass or powder, which becomes yellow when kept, and has a bitter taste. It is very soluble in water and alcohol.

The iodide has the general properties of calcium salts, and is given in solution to heal chronic ulcerations.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

## CALCII LACTAS.

CALCIUM LACTATE.



Calcium lactate,  $\text{Ca}(\text{CH}_3\text{CHOHCOO})_2$  may be prepared by dissolving calcium carbonate in warm diluted lactic acid, filtering while hot, and crystallising. Large quantities are obtained, as an intermediate product, in the preparation of lactic acid.

It occurs in white granular masses or powder, or in acicular crystals, odourless, and having scarcely any taste. Soluble in water (1 in 15), less so in hot water, slightly soluble in alcohol, insoluble in ether. The solubility of the salt is affected by age. It becomes anhydrous at  $100^{\circ}$ .

Calcium lactate increases the coagulability of the blood. It is given before operations with this object (1 or 2 gramme doses—15 or 30 grains); against chilblains and chronic ulcerations; in hæmophilia and some forms of albuminuria; in rickets and tuberculous disease. It is much less irritant than calcium chloride, and may be injected subcutaneously. The solubility of different

specimens of calcium lactate varies considerably. The large doses now given may be suspended in water, or as this salt is permanent in the air it may be dispensed in powders or in cachets.

*Dose.*— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

## CALCII LACTOPHOSPHAS.

### CALCIUM LACTOPHOSPHATE.

Calcium lactophosphate is a mixture or compound of calcium phosphate and calcium lactate. It may be prepared by mixing calcium carbonate, 15; lactic acid, 30; phosphoric acid, 9.86; water, 150, and evaporating to dryness in a warm place or over sulphuric acid, but not on a water-bath.

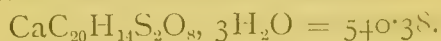
It occurs as a white, hygroscopic, crystalline powder. Soluble in water. Some commercial varieties contain much less calcium phosphate than it would contain as a compound, and as little as 3 per cent. has been found.

Calcium lactophosphate is a stomachic tonic, especially useful for children. It is generally used in the form of *Syrupus Calcii Lactophosphatis*, which contains in solution the equivalent of about 2.5 per cent. of tricalcic phosphate. The syrup is pleasantly acid to the taste and may be combined with ferrous lactate as *Syrupus Ferri et Calcii Lactophosphatis*. Calcium lactophosphate is a constituent of some proprietary nutritive powders, recommended to be mixed with milk and taken when lime salts and phosphates are indicated.

*Dose.*—2 to 5 decigrams (3 to 8 grains).

## CALCII NAPHTHOL-SULPHONAS.

### CALCIUM NAPHTHOL-SULPHONATE.



*Synonyms.*—Calcium  $\beta$ -naphthol- $\alpha$ -monosulphonate; Calcinaphthol.

Calcium naphthol-sulphonate,  $\text{Ca}(\text{C}_{10}\text{H}_7\text{OH}\text{SO}_3)_2, 3\text{H}_2\text{O}$ , is obtained by heating 10 of  $\beta$ -naphthol with 8 of sulphuric acid on a water-bath, until the mass dissolves clear in water, then diluting with water, neutralising with calcium carbonate, and evaporating the filtrate.

It occurs in the form of a white or reddish-white powder, odourless, bitter, afterwards sweetish, neutral, very soluble in water (1 in 1.5) and alcohol (1 in 3). When heated to 50° it undergoes decomposition. It gives a blue colour with ferric chloride. If 50 mils of a dilute solution be shaken with 1 mil of sulphuric acid and 25 grammes of lead peroxide for five minutes, filtered and shaken with 1 mil of chloroform, the latter assumes a yellow colour. On evaporating the chloroform and adding a drop of concentrated sulphuric acid to the residue a green colour is produced. It precipi-

tates albumin, peptone, etc., from acid solution, and is incompatible with quinine salts, antipyrine, potassium iodide, etc. It is non-toxic, and is rapidly eliminated by the urine.

Calcium naphthol sulphonate possesses the properties of the salicylates, and is an analgesic and antipyretic antiseptic. It is recommended in acute articular rheumatism, sciatica, and to reduce the high temperature in influenza. If given in solution its taste may be masked by simple elixir or tincture of orange. Cachets form a convenient method of administering the dry substance. Calcium naphthol sulphonate has been used to preserve wines and articles of diet.

*Dose.*— $\frac{1}{2}$  to 1 gramme (5 to 15 grains).

NOTE.—Calcium naphthol-sulphonate is also known under the trade-names Abrastol and Asaprol.

## CALCII PEROXIDUM.

CALCIUM PEROXIDE.



*Synonyms.*—Calcium Dioxide; Calcium Superoxide.

Calcium peroxide,  $\text{CaO}_2$ , may be prepared by adding lime water to a solution of hydrogen peroxide; the hydrated dioxide thus formed ( $\text{CaO}_2 \cdot 8\text{H}_2\text{O}$ ), when heated to  $100^\circ$  to  $120^\circ$ , is converted into the anhydrous dioxide.

It occurs as a whitish powder. Very sparingly soluble in water. On heating it is rapidly decomposed into calcium oxide and oxygen, and it is slowly decomposed, with evolution of oxygen, in the presence of water. In contact with glycerin or formalin it is liable to form explosive mixtures.

Calcium peroxide possesses antacid and antiseptic properties, and has been used as an intestinal disinfectant; it has also been employed in the treatment of digestive disturbances in children, especially in acid dyspepsia, being given in milk.

*Dose.*—2 to 5 decigrams (3 to 8 grains).

NOTES.—Calcium peroxide is also known under the trade-name Gorit; its use in the form of tooth-powder (Calox) is the subject of patent rights.

## CALCII PHOSPHAS.

CALCIUM PHOSPHATE.



*Synonyms.*—Calcii Phosphas Præcipitatus; Precipitated Calcium Phosphate.

Calcium phosphate,  $\text{Ca}_3(\text{PO}_4)_2$ , may be prepared by purifying bone ash, or by the interaction of calcium chloride and sodium phosphate. By the former method normal tri-calcium orthophosphate,  $\text{Ca}_3(\text{PO}_4)_2$ , is obtained, by the latter calcium hydrogen phosphate,  $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$ .



It occurs as a light white amorphous powder, insoluble in water, soluble in dilute mineral acids. It should be free from lead, copper, arsenium, iron, aluminium, magnesium, carbonates, oxalates, and silica, and not more than traces of chlorides should be present. It should contain not less than 95 per cent. of pure anhydrous calcium phosphate.

Calcium phosphate forms three-fourths of the mineral matter in the body. It is contained mostly in the bones to which it gives rigidity. It has been claimed that deprivation from lime salts is the cause of rickets. In rickets the growth of bone is impaired, not in amount, for that is excessive, but in quality; and the deficiency in calcium is only secondary to this change, for the other parts of the body always retain their normal percentage of lime. This is not due to a deficient absorption of lime, since rickety children excrete as much in the urine as normal children. Calcium is essential for life and for the action of certain ferments such as fibrin ferment and rennet.

Calcium phosphate is an important constituent of the well-known Syrupus Ferri Phosphatis Compositus, which contains about 1 decigram in  $7\frac{1}{2}$  mils ( $\frac{1}{5}$  grain in 1 fluid drachm). The syrup of calcium lactophosphate contains 2.5 per cent. of calcium phosphate in combination with lactic acid. In the solid form, calcium phosphate may be given in powders, mixed with milk or in cachets. On account of its non-hygroscopic properties, it is sometimes used as a diluent of active powders, as in the case of Extractum Euonymi Siccum.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

## CALCH SULPHAS EXSICCATUS.

EXSICCATED CALCIUM SULPHATE.



*Synonyms.*—Plaster of Paris; Sulphate of Lime; Calcined Gypsum.

Exsiccated calcium sulphate,  $\text{CaSO}_4$ , is prepared by carefully roasting natural gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) until the product contains less than 5 per cent. of water.

It occurs as a fine white hygroscopic powder, inodorous and tasteless. Slightly soluble in water, more soluble in diluted mineral acids, insoluble in alcohol, neutral to litmus. It should be free from carbonate. When mixed with a little water it forms a smooth paste which rapidly sets to a hard mass; if completely dehydrated, or heated above  $200^\circ$ , or if much hygroscopic moisture has been absorbed, it loses this property.

The principal use of plaster of Paris in pharmacy is for the preparation of plaster bandages. For this purpose check muslin (or domette) is used as the bandaging material. The powder is applied thickly to the bandage before rolling; after rolling, the whole is thoroughly moistened and wound round the limb; or the plaster is mixed to a thin cream in a basin, and the unrolled bandaging

material passed through the cream immediately before applying to the limb. The plaster will set and a splint be formed in fifteen or twenty minutes. One and a half to 2 parts of water to 1 of plaster forms a suitable proportion. The bulk of the mass increases slightly as the plaster sets; interstices are thus filled and close application obtained.

NOTES.—Exsiccated calcium sulphate should be kept in well-closed vessels. A pure precipitated calcium sulphate is obtainable for analytical work. Solution of calcium sulphate is prepared by triturating 1·25 of the sulphate with 10 of distilled water, shaking the mixture with 90 of distilled water, and filtering.

## CALENDULA.

### CALENDULA.

*Synonym.*—Marigold Florets.

*Calendula* consists of the dried ligulate florets of the common marigold, *Calendula officinalis*, Linn. (N.O. Compositæ), a native of the Levant and South Europe, but now found in all parts of England. The ligulate ray florets are collected when the flowers are fully open and dried.

The florets are yellow or orange-coloured, about 15 to 25 millimetres long and 3 millimetres broad, the short, hairy tube generally enclosing the remains of a filiform style and bifid stigma. The limb of the corolla terminates in three teeth, and has four veins. The odour is slightly aromatic and the taste bitter.

The chief constituents of the drug are a tasteless yellow substance named calendulin, a bitter principle, and traces of volatile oil.

*Calendula* was at one time believed to have the power of promoting the absorption of blood effusions. The tincture is taken internally in doses of 12 decimils (20 minims) for amenorrhœa; it is also used, diluted with 10 to 20 parts of water, as a lotion for sprains and bruises.

## CALOTROPIS.

### CALOTROPIS.

*Synonyms.*—Mudar; Madar.

*Calotropis* is the dried root-bark of *Calotropis procera*, R. Brown, and of *Calotropis gigantea*, R. Brown (N.O. Asclepiadææ).

The drug occurs in short, more or less quilled pieces, about 2 to 5 millimetres thick, and 2 to 3·5 centimetres wide, to which rootlets are sometimes attached. Externally it is covered with a soft, pale buff, longitudinally furrowed and wrinkled cork; on the inner surface it is pale yellow and granular. The fracture is short and mealy, the fractured surface being white. The taste is bitter and acrid. A transverse section exhibits a thick buff-coloured cork, and a white inner portion. The starch, chiefly situated in the cortex, is very characteristic, consisting of simple or compound grains, the former being mostly  $3\mu$  to  $10\mu$  long, with a distinct hilum and conspicuous striations; the compound grains are usually composed of two

constituent grains. The cortex and bast contain abundant laticiferous vessels, and the medullary rays are one cell wide.

The chief constituents of calotropis are a yellow bitter resin, a black acid resin, a crystalline colourless substance (madaralban) an amber-coloured viscid substance (madarfluavil) and caoutchouc.

Calotropis resembles ipecacuanha in its action; small doses are diaphoretic and expectorant, and large doses cause vomiting and diarrhœa.

*Dose.*—As an expectorant 2 to 6 decigrams (3 to 10 grains); as an emetic, 2 to 4 grammes (30 to 60 grains).

*NOTE.*—Calotropis is official in India and the Eastern Colonies.

## CALUMBÆ RADIX.

CALUMBA ROOT.

*Synonym.*—Calumba.

Calumba root consists of the dried transverse slices of the root of *Jateorhiza Columba*, Miers (N.O. Menispermaceæ), a climbing plant indigenous to Portuguese East Africa, and growing freely in forests near the Zambesi. The roots are dug up during the dry season, cut into transverse slices, and dried. The somewhat dull colour of the drug as imported is often brightened by a process of cleaning.

Calumba root occurs in commerce in flattish discs, varying from 2.5 to 5 centimetres in diameter, and from 3 to 12 millimetres in thickness. They are usually depressed in the centre on both sides, due to contraction on drying, and are of a more or less distinct yellow colour, the exterior being covered with thin, dark brown, wrinkled cork. The parenchymatous tissue of both wood and bark is largely developed, and contains abundant starch. The fracture is short and starchy, the odour slight, and the taste bitter. The drug often contains portions of the rhizome from which the roots spring; these may be recognised by their smaller size (about 2 centimetres in diameter), narrow cortex, and conspicuously radiate wood, with strongly developed lignified tissue, in consequence of which the centre of the slices is prominent instead of being depressed. A transverse section of calumba root exhibits under the microscope a cork consisting of a few rows of narrow brown cells, a wide cortex and bast-ring containing narrow bast-rays devoid of fibres, and a wood composed of abundant parenchymatous tissue, in which radially elongated groups of pitted vessels are scattered. Near the cork there occur sclerenchymatous cells containing in their cavities prismatic crystals of calcium oxalate. The starch grains with which the parenchymatous cells of both cortex and wood are filled are mostly simple and of large size ( $20\mu$  to  $70\mu$ ); they are irregularly ovoid in shape, and exhibit a distinct radiate or cleft hilum. Powdered calumba is characterised particularly by the sclerenchymatous cells with calcium oxalate, the starch grains, and the yellow colour of the sclerenchymatous elements.



The chief constituents of calumba root are columbamine, palmatine, and jateorhizine, three yellow crystalline alkaloids, closely allied to berberine; the drug also contains a colourless, crystalline principle, columbin, and yellow amorphous columbic acid. All these constituents contribute to the bitter taste of the drug. A fluorescent principle is also present, as well as an abundance of starch and some mucilage. Tannin is not a normal constituent of the drug. The root yields from 4 to 7 per cent. of ash, but pieces of rhizome may yield from 12 to 17 per cent.

Calumba is a pure bitter, and is used in atonic dyspepsia and debility of the digestive organs (see under Gentian); its preparations possess the advantage of being compatible with salts of iron. Powdered calumba root and extract of calumba are used in pills, the former also in cachets with rhubarb and soda. Infusion and tincture of calumba are common constituents of bitter tonics, acid or alkaline.

*Dose.*— $\frac{1}{2}$  to 2 grammes (8 to 30 grains).

*NOTES.*—The following drugs have been substituted for, or used to adulterate, calumba root:—(1) Slices of the stem of *Coscinium fenestratum*, Colebr. (N.O. Menispermaceæ), Ceylon; these are dark yellow in colour, hard and woody; not starchy or depressed in the centre. (2) Slices of the root of *Frasera caroliniensis*, Walter (N.O. Gentianæ), North America; these are smaller, thicker, and contain tannin, but no starch.

## CALX.

### LIME.

$\text{CaO} = 56 \cdot 10$ .

*Synonym.*—Calcium Oxide.

Lime or calcium oxide,  $\text{CaO}$ , is obtained by strongly heating chalk, limestone, or marble.

It occurs as white or greyish-white masses, which absorb carbon dioxide and water if exposed to the air. When about half their weight of water is added the masses swell with the evolution of much heat, and fall to powder. It is inodorous, has an alkaline reaction and a caustic, burning taste. Soluble in water (about 1 in 900), less soluble in hot water; sugar and glycerin greatly increase its solubility. Lime should not contain more than traces of iron, aluminium, magnesium, sodium, potassium, carbonates, chlorides, phosphates, sulphates, or silica.

Besides its use for the preparation of calcium hydroxide and to neutralise acids or absorb water in some chemical processes (*e.g.*, chloroform), quicklime is a constituent of caustic pastes, such as Pasta Londinensis, a mixture of quicklime with caustic soda, made into a paste with water at the time of using. Quicklime slaked with solution of soda with subsequent drying and heating to redness forms soda-lime, a substance used in the ultimate analysis of nitrogenous substances.

*NOTE.*—The best lime for medicinal purposes is prepared from marble.

**CALX CHLORINATA.****CHLORINATED LIME.**

*Synonyms.*—Bleaching Powder; Chloride of Lime.

Chlorinated lime is prepared by exposing slaked lime to the action of chlorine gas until absorption ceases. It is a mixture or weak compound of hypochlorite and chloride of calcium with slaked lime.

It occurs as a dull white or greenish-white powder, dry, amorphous, and having a very peculiar odour, somewhat different from that of chlorine. On exposure to the air it becomes moist and gradually decomposes, absorbing carbon dioxide and liberating chlorine. Partially soluble in water and in alcohol. It is decomposed by acids evolving chlorine by decomposition of the hypochlorite present. The chlorine thus evolved is the "available chlorine" on which the value of the sample entirely depends. On titration with standard solution of sodium thiosulphate, after the addition of potassium iodide and hydrochloric acid, at least 33 per cent. of available chlorine should be indicated.

Chlorinated lime in powder is used to destroy effluvia and as a general disinfectant. Its solution in water (*Liquor Calcis Chlorinata*) contains about 3 per cent. of available chlorine when freshly prepared, and is the most suitable means of applying its antiseptic properties externally. One part of the liquor with 12 to 20 parts of water forms a lotion for cleansing ulcers, for use as vaginal and nasal injections, or as a gargle for septic tonsillitis and diphtheria.

NOTE.—*Calx Chlorinata*, U.S.P., should contain not less than 30 per cent. of available chlorine.

**CALX SULPHURATA.****SULPHURATED LIME.**

Sulphurated lime is a mixture containing nearly 50 per cent. of calcium sulphide ( $\text{CaS} = 71.63$ ), prepared by mixing calcium sulphate (70 parts), charcoal (10 parts), and starch (2 parts), packing the mixture lightly into a crucible, covering loosely, and heating to bright redness until the contents have lost the black colour. The product after cooling is powdered and at once transferred to well-stoppered bottles.

It occurs as a greyish-white amorphous powder, with an odour of hydrogen sulphide, a disagreeable alkaline taste and an alkaline reaction; gradually altered by exposure to the air. Sparingly soluble in water; insoluble in alcohol. When tested, by precipitating copper sulphate in the presence of acid, 50 per cent. of calcium sulphide should be indicated.

Sulphurated lime is used to arrest and prevent suppuration, especially in boils, carbuncles, and acne. It has been used externally as a depilatory in a similar manner to barium sulphide. It is best dispensed in pills, which should be well varnished (not silvered) and kept in a bottle. The pills are best prepared with glycerin of tragacanth and sufficient sugar of milk. Capsules and tablets of various strengths are also made. The odour of

Calx Sulphurata and its preparations is due to decomposition of the sulphide by moisture, with evolution of sulphuretted hydrogen; the salt should therefore be kept as dry as possible, and no water used in dispensing it. A solution of calcium polysulphides is prepared under the name of Vleminckx's solution, for application to the skin (see Lotio Calcis Sulphurata).

*Dose*.—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTE*.—Calx Sulphurata, U.S.P., should contain at least 60 per cent. of calcium sulphide.

## CAMBOGIA.

### GAMBOGE.

Gamboge is a gum-resin obtained from *Garcinia Hanburyi*, Hook. f. (N.O. Guttiferæ), a tree growing in Siam, Cambodia, and the southern part of Cochin China. In the cortex and bast of the tree are secretory ducts filled with a yellow, milky, gum-resinous juice. This is obtained by making spiral cuts in the bark to a height of about 3 metres above the ground. The gum-resin as it exudes is received in hollow bamboos, and from these it is transferred to smaller bamboos, in which it is allowed to harden.

It occurs in solid or hollow rolls, sticks, or cylinders (pipe gamboge), 2.5 to 5 centimetres thick, and 10 to 20 centimetres in length, exhibiting longitudinal striations derived from the inner surface of the bamboo in which the drug has been dried; the fractured surface is smooth, glossy, and of a uniform brownish-orange colour. It has no odour, but an acrid taste; with water it yields a yellow emulsion, which becomes darker in colour and almost clear on the addition of solution of ammonia (absence of appreciable quantities of starch, sand, etc.). Solution of iodine should not impart a distinct green colour to a cooled decoction (absence of more than a trace of starch). Pure gamboge yields about 1 per cent. of ash, the official limit being 3 per cent.

The drug contains about 75 to 85 per cent. of resin acids associated with 15 to 20 per cent. of gum and small quantities of vegetable debris. The resin forms with alkalies readily soluble compounds.

Gamboge is a powerful hydragogue cathartic, causing in large doses much irritation and griping. It is employed in dropsical conditions and in cerebral congestion, but is rarely used alone on account of its drastic action. It is a constituent of *Pilula Cambogiæ Composita*, in which form it is most usually prescribed. An ammoniated tincture can be prepared with ammoniated alcohol; this is miscible with water without precipitation.

*Dose*.—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

*NOTES*—Gamboge is sometimes imported in cakes of varying size and appearance, but these are often adulterated with sand, starch, etc., and are not official. Saigon gamboge is frequently imported in oval cakes wrapped in palm leaves. The appearance of the fractured surface, the solubility in ammonia and the amount of ash readily indicate the quality of gamboge. The chief adulterants are starch, inorganic matter and vegetable debris; these are insoluble



in alcohol and water (used successively) or in dilute ammonia. Starch may be detected by the iodine test, and inorganic substances, if present, will increase the percentage of ash.

## CAMBOGIA INDICA.

### INDIAN GAMBGE.

Indian gamboge is the gum-resin obtained from *Garcinia Morella*, Desrouss. (N.O. Guttiferæ), a tree growing in India.

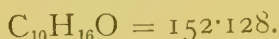
It occurs in pieces of irregular shape, and should answer to all the important characters and tests given under Cambogia. It should be free from pieces of wood, leaves, and similar impurities.

Indian gamboge has a similar action to that of gamboge, and it is used as an equivalent of gamboge in India and the Eastern Colonies.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

## CAMPHORA.

### CAMPHOR.



Camphor,  $\text{C}_{10}\text{H}_{16}\text{O}$ , is a white crystalline substance obtained from the camphor tree, *Cinnamomum camphora*, Nees and Eberm. (N.O. Laurineæ), a tree growing abundantly in Formosa, Japan, and the Chinese continent. The wood of the tree in small pieces is subjected to a rough process of distillation with water vapour; crude camphor containing a varying quantity of yellowish oil (camphor oil) is thus obtained, and further purified by resublimation. According to the manner of condensation it is collected in wide rings known as "bells," or pulverulent masses termed "flowers of camphor." The latter are often compressed into rectangular tablets.

Camphor occurs as a colourless, transparent, crystalline solid. It has a powerful penetrating odour and pungent somewhat bitter taste, followed by a slight sensation of cold. It burns readily, with a bright smoky flame, volatilises at ordinary temperatures and sublimes without residue when heated. Specific gravity, 0.986 to 0.996 (about 0.990 at 25°). It is soluble in water (1 in 700), alcohol (1 in 1 $\frac{1}{4}$ ), olive oil (1 in 4), in chloroform (4 in 1), ether (12 in 7), oil of turpentine (1 in 1 $\frac{1}{2}$ ), and glacial acetic acid (2 in 1). It forms a liquid when triturated with chloral hydrate, phenol, menthol, or thymol.

Camphor appears to be a ketone or a keto-tetrahydro-cymene with the formula  $\text{C}_{10}\text{H}_{16}\text{O}$ . It may be prepared artificially by the oxidation of camphene or isoborneol. When applied externally, camphor dilates the vessels of the skin, and is used as a rubefacient and mild counter-irritant. Internally, camphor has much the same action as the volatile oils, and is prescribed as a carminative in flatulence and as an antiseptic for the alimentary canal. It mildly excites the circulation, dilating the superficial vessels and slightly

increasing the cardiac output. It also directly excites the cerebrum. It is a popular remedy either taken by the mouth or administered as a snuff for the relief of colds. For internal use, camphor is given in the form of a pill, massed with a little soap and glycerin of tragacanth, or sometimes combined with extract of henbane. Camphor water contains about 3 centigrams in 30 mls ( $\frac{1}{2}$  grain per fluid ounce). Other preparations of camphor for internal use are the spirit (1 in 10 of alcohol), suitable for admixture with sal volatile or ammoniated tincture of quinine in the form of drops, and the stronger spirit of camphor (Rubini's Essence, a saturated alcoholic solution) given on sugar or in milk. Paregoric elixir contains camphor in association with opium, anise, and benzoic acid, and is especially useful in chronic bronchitis. Camphor is a common ingredient of stimulating and anodyne liniments. Camphorated oil contains 1 of camphor dissolved in 4 of olive oil; ammoniated camphor liniment (1 in 8) contains strong solution of ammonia, oil of lavender, and alcohol. Camphorated chalk is a popular dentifrice. Stimulating and emollient ointments of camphor for use against chilblains and cracked skin contain about 1 part in 6, with wax, almond oil, and sometimes a small percentage of thymol. The liquid obtained by mixing equal weights of camphor and chloral is used as an anodyne pigment, sometimes with the addition of cocaine. In medicated soaps camphor is combined with borax, or with sulphur and balsam of Peru.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

### CAMPORA CUM CRETA.

CAMPOR WITH CHALK.

*Synonym.*—Camphorated Chalk.

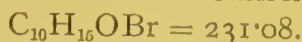
Camphor, in fine powder	...	...	...	10·00
Precipitated Chalk	...	...	...	90·00

Triturate the camphor with a small quantity of alcohol, add the chalk, and pass through a fine sieve.

Camphorated chalk is a refreshing, cleansing, and entirely harmless dentifrice. It should be stored in a cool place in order, as far as possible, to avoid loss of camphor by evaporation.

### CAMPORA MONOBROMATA.

MONOBROMATED CAMPOR.



*Synonyms.*—Monobrom-camphor; Ortho-bromo-camphor.

Monobromated camphor,  $\text{C}_{10}\text{H}_{15}\text{BrO}$ , is a substitution product, prepared by the action of bromine on camphor.

It occurs in colourless prismatic needles or scales, with a weak but persistent camphoraceous odour and taste, and a neutral reaction, insoluble in water, readily soluble in alcohol (1 in 12),

ether (1 in 2), chloroform (10 in 7), olive oil (1 in 8), sparingly in glycerin. Melting-point,  $76^{\circ}$ . Boiling-point,  $274^{\circ}$ , vapourising completely, with partial decomposition. It evaporates slowly with the vapour of boiling water. It is permanent in air and is not affected by direct sunlight. It dissolves without decomposition in cold sulphuric acid, and is again precipitated on pouring the solution into water. Boiled with silver nitrate and nitric acid it is decomposed, yielding 81.2 per cent. of silver bromide. Sodium amalgam reduces it to camphor. It should be neutral to litmus, and free from soluble bromides.

Monobromated camphor is used as a sedative and hypnotic, especially in chorea, hysteria, and delirium tremens. Its use in large doses requires caution, as it may cause epileptiform convulsions. Its chief objections are its unpleasant taste and smell and its irritant effect on the stomach. It is best dispensed in gelatin capsules, the crystals being powdered and made into a soft mass with liquid paraffin or olive oil. Pills are prepared with glucose and compound tragacanth powder. Small doses may be dissolved in olive oil (8 parts of oil are required for solution) and emulsified with acacia.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

*NOTE.*—In cases of delirium tremens as much as 1 to  $1\frac{1}{2}$  grammes (15 to 22 grains) has been given for a dose.

## CANELLÆ CORTEX.

CANELLA BARK.

*Synonym.*—Wild Cinnamon Bark.

Canella bark is obtained from the wild cinnamon tree, *Canella alba*, Murray (N.O. Canellaceæ), a tree indigenous to the West Indian Islands. A thick outer layer of ash-grey cork is first removed from the bark by beating; this also loosens the remainder of the bark, which can then be stripped off and dried.

The bark occurs in simple quills or channelled pieces, of very variable size, but commonly from 6 to 25 millimetres wide, 5 to 20 centimetres long, and up to 3 millimetres thick. The outer surface is pale yellow in colour, hard, wrinkled, and marked with circular scars. The internal surface is white, and finely striated longitudinally. The bark breaks with a short granular fracture, the transverse section exhibiting a narrow, yellowish-brown phelloderm, a paler cortex in which numerous oil-cells are situated, and a bast in which white wavy medullary rays may be seen. The drug has an aromatic cinnamon-like odour, and a pungent bitter taste.

The chief constituent of canella bark is the volatile oil, which exists to the extent of about 1 per cent.; it contains eugenol, lavo-pinene, cineol, and caryophyllene. The bark also contains a bitter principle which has not been fully investigated.

Canella bark is an aromatic bitter. A mixture of the powdered bark with aloes is a common domestic medicine, sold under the name "Hiera Picra" (see Pulvis Aloes cum Canella), and largely used as an emmenagogue.



**CANNABINUM TANNAS.****CANNABIN TANNATE.**

Cannabin tannate is a substance commercially prepared by distilling Indian hemp with steam to deprive it of its volatile oil, extracting with water, precipitating the aqueous extract with lead acetate, decomposing this with hydrogen sulphide and combining the cannabine thus set free with tannic acid; or the aqueous extract may be directly precipitated with tannic acid.

It occurs in the form of a yellowish-grey or brownish powder, amorphous, and having a somewhat bitter and strong astringent taste, and a not unpleasant odour. Sparingly soluble in water, alcohol, or ether; soluble in acidulated alcohol, and in water made alkaline. On ignition it should leave not more than 0.1 per cent. of residue. It should dissolve without residue in 10 parts of alcohol containing 10 per cent. of hydrochloric acid, and should be free from narcotic odour.

Cannabin tannate is used as a hypnotic in nervous insomnia, also in dysmenorrhœa and menorrhagia, and is said to be free from the intoxicating properties of Cannabis Indica. Its activity varies very greatly, but it is generally of little value. It is usually dispensed in pills, massed with glycerin of tragacanth, or in cachets; it may be dissolved in sal volatile and water, but has a disagreeable astringent taste.

*Dose.*— $2\frac{1}{2}$  to 5 decigrams (4 to 8 grains).

**CANNABINONUM.****CANNABINONE.**

*Synonym.*—Cannabis Resin; Hemp Resin.

Cannabinone is a purified resin obtained from Indian hemp. It is prepared by treating an alcoholic extract of Indian hemp with caustic alkali. The residue ("pure hashish") is said to consist essentially of a mixture of a soft resin and a tetanising principle. On removing the latter by means of tannic acid, cannabinone is obtained.

It occurs in the form of a soft, brown, neutral resin of treacle-like consistence, with a disagreeable taste and a tendency to become inert on exposure to air, its loss of activity being apparently due to oxidation. Insoluble in water, but soluble in alcohol, ether, chloroform, benzene, and fixed and volatile oils.

Cannabinone is used as a hypnotic in hysteria and insomnia. Its action is more certain than that of cannabin tannate, though it also is occasionally inactive; large doses may cause excitement and collapse. For dispensing purposes it is generally used in the form of a trituration, 1 in 10, with milk sugar, which may be enclosed in cachets, or made into pills with glycerin of tragacanth.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

**CANNABIS INDICA.**

## INDIAN HEMP.

*Synonym.*—Indian Cannabis.

Indian hemp consists of the dried flowering or fruiting tops of the pistillate plant of *Cannabis sativa*, Linn. (N.O. Urticaceæ), grown in India. The hemp plant is an annual diœcious herb, indigenous to Central India and Western Asia. When grown in tropical countries the pistillate plant produces an oleo-resinous secretion, to which the physiological action of the drug is due. This secretion is formed in stalked glands, which are particularly abundant on the upper leaves and bracts, to increase the number of which the plants are carefully pruned. The staminate plants are eradicated before they arrive at maturity, but the pistillate plants produce a few staminate flowers, which fertilise many of the pistillate. The tops are collected, allowed to wilt, and pressed by treading with the feet into flattened masses, which remain more or less compacted together by the adhesive resinous secretion. In this form the drug is exported from Bombay, and known commercially as guaza. A more active variety is the Bengal drug, which is termed ganjah. This is in smaller, shorter masses which are rounded instead of flattened, and hence sometimes called round ganjah. It is exported from Calcutta, but such as reaches this country is re-exported, and practically none is offered on the market. It is largely consumed in India, but rapidly deteriorates in activity.

Indian hemp occurs in rough, flattened, brownish-green masses, from 5 to 30 centimetres long, consisting of the branched upper part of the stem, bearing leaves and pistillate flowers or fruits matted together. The lower leaves are digitate, and consist of from five to seven lanceolate-acuminate sharply serrate leaflets, the upper of from one to three. The ovary, which is surrounded by an ovate bract, bears two long dark red stigmas, which are easily visible under a lens. All parts of the drug, but particularly the bracts, stipules, and upper leaves, bear numerous resin glands, as well as large curved hairs, many of which contain cystoliths in the enlarged base.

The narcotic effect of Indian hemp appears to be produced by the resinous secretion of the glands. This resin has been obtained as a soft, brown substance (cannabinone), the chief constituent of which is cannabinol. This compound has been obtained from charas in the form of a viscid, reddish oil, possessing a powerful narcotic action, but resinifying and becoming less active on exposure to the air; cannabinol may also be obtained from hashish, etc. In addition to the resin and its important constituent cannabinol, Indian hemp also contains fat, wax, the alkaloid choline, and traces of volatile oil. It yields from 10 to 12 per cent. of substances soluble in alcohol, and leaves, when incinerated, about 15 per cent. of ash. Hemp resin of different seasons and from different districts contains different amounts of cannabinol; the attempt has therefore been made to

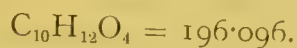
standardise preparations of Indian hemp, by determination of the amount of cannabinal and by experiments on animals.

Indian hemp acts chiefly on the central nervous system. It first produces excitement with hallucinations, a feeling of happiness and indifference to surroundings, this stage being followed by deep sleep. The hallucinations include inability to estimate time and space. In the East the hemp is smoked and almost immediately produces symptoms of pleasurable excitement, followed by depression and lethargy. It is used as an anodyne, sedative, or hypnotic in mania, spasmodic coughs, asthma, acute neuralgia, dysmenorrhœa, and tetanus. It does not produce constipation nor loss of appetite. An alcoholic extract of Indian hemp is the basis of medicinal preparations of this drug, and from it the tincture is prepared. The extract is usually prescribed in pills, which may be massed with lycopodium or powdered liquorice. The tincture is frequently ordered in mixtures, and the large proportion of resin it contains requires the use of 4 mils (1 fluid drachm) of mucilage of acacia in each 30 mils (1 fluid ounce) of mixture for its proper suspension. Indian hemp mixtures present no difficulty if the following procedure be adopted:—Dilute the mucilage (in the proportion mentioned above) with twice its bulk of water and add the tincture—measured in a dry measure—in successive small portions, agitating slightly after each addition. Tincture of Indian hemp is a constituent of, and gives the green colour to, compound tincture of chloroform and morphine. Indian hemp is sometimes smoked, against asthma. Used thus, its action is more rapid than when taken internally. In cases of poisoning, the stomach should be evacuated, alcoholic stimulants given, and strychnine injected hypodermically.

NOTES.—In addition to the ganjah (or guaza) the larger leaves of the plant are also collected, and form, when dried, “*bhang*” or “*hashish*”; this is generally consumed by making it into a confection or drink. Sometimes the plants are beaten on to cloths and the resin which adheres to them collected; this is known as *charas* or *churrus*, and like ganjah, is commonly smoked. It is on account of the possible separation of the resin that the British Pharmacopœia specifies the drug “from which the resin has not been removed.” Preparations are most active when made from an extract prepared in India from the fresh drug, and exported in sealed tubes. Hemp tops grown in more temperate climates have been offered in place of Indian hemp, but may be distinguished by their brighter colour and less resinous nature.

## CANTHARIDINUM.

### CANTHARIDIN.



Cantharidin,  $\text{C}_{10}\text{H}_{12}\text{O}_4$ , the anhydride, or lactone, of cantharidic acid, is obtained from *Cantharis vesicatoria* and other blistering beetles. It may be obtained by digesting powdered cantharides, 1000, with a mixture of concentrated sulphuric acid, 20, and acetic ether, 1500, for two days at ordinary temperature, then mixing with barium carbonate, 40, and exhausting the mixture with acetic ether,



The latter is distilled off and the residue set aside for some days for the cantharidin to crystallise out, when it is covered with petroleum ether (specific gravity, 0.740), 200, and gently warmed, to dissolve the fat. The solution is filtered, and the cantharidin washed with petroleum ether and recrystallised from hot alcohol.

It occurs in white rectangular prisms or scales, odourless and tasteless. Very slightly soluble in cold water, sparingly soluble in alcohol and in ether (1 in 700), more soluble in acetic ether (1 in 150), readily soluble in chloroform (1 in 65), acetone (1 in 40), glacial acetic acid, and almond oil (1 in 1,000). Melting-point, 218°. It will sublime at a temperature of about 120°. It dissolves in solution of sodium or potassium hydroxides, with the formation of a cantharidate of the base. From these solutions, however, the addition of acids causes reprecipitation of cantharidin.

Solutions of cantharidin are used in place of corresponding preparations of cantharides as being more uniform in strength. The alkaline cantharidates have been given by the mouth and by hypodermic injection, in lupus and other tuberculous diseases. Emplastrum Cantharidini contains 1 part of cantharidin in 500. For a stimulating hair lotion 60 milligrams (1 grain) of cantharidin dissolved in 15 mls (4 fluid drachms) of acetone, with 60 mls (2 fluid ounces) of castor oil and alcohol to 300 mls (10 fluid ounces), forms a suitable solution. This may be further diluted for sensitive skins. A solution of cantharidin for internal use contains 1 milligram ( $\frac{1}{60}$  grain) dissolved in 2 mls (30 minims) of absolute alcohol with water to make 100 mls ( $3\frac{1}{3}$  fluid ounces). This contains 1 in 100,000 of cantharidin. Potassium and sodium cantharidates are prepared for hypodermic injection by dissolving cantharidin in the corresponding alkaline hydroxides. Liebreich advocates the use of cantharidates for tuberculosis and also for lupus and pityriasis rubra, in doses of  $\frac{1}{1000}$  grain daily. Liebreich's solution consists of 2 decigrams of cantharidin and 4 decigrams of potassium hydroxide, dissolved in 1,000 mls distilled water; it is given in doses of 5 decimils (8 minims). In cases of poisoning by cantharidin, emetics should be given and the stomach-pump used, followed by mucilaginous drinks, with ice, camphor, and opium; fats should be avoided.

*Dose.*— $\frac{1}{4}$  to  $\frac{1}{2}$  milligram ( $\frac{1}{240}$  to  $\frac{1}{120}$  grain).

## CANTHARIS.

### CANTHARIDES.

*Synonym.*—Spanish Flies.

Cantharides consists of the dried beetle, *Cantharis vesicatoria*, Latr. (Order Coleoptera), which is widely distributed over Southern Europe, living gregariously in olive trees, ash trees, etc. The beetles are collected before sunrise, whilst unable to use their wings, by shaking them from the trees on to cloths spread underneath. They are then killed by means of ammonia, vinegar, or sulphur dioxide; or by stove heat.

The beetles are from 18 to 25 millimetres long and about 6 millimetres broad, smooth, and of a shining green or bronze-green colour. The wing-cases are long and narrow, and conceal two transparent, brown membranous wings. When fresh they have a strong and disagreeable odour, which diminishes by keeping.

The chief constituent of cantharides is cantharidin, a crystalline lactone, of which good specimens yield from 0.4 to 0.8 per cent. It exists in the beetles chiefly in the free state, but a varying proportion (about 0.03 to 0.30 per cent.) is combined in the form of salts. Cantharides also contains about 12 per cent. of fat, and about 7 per cent. of ash is left on incineration.

The drug, or its preparations, when applied to the skin, produces redness followed by vesicles, which coalesce to form a blister. Externally, preparations of cantharides are used as rubefacients, counter-irritants, and vesicants. Internally, it is very irritant to the alimentary canal; after absorption it constricts the vessels, and during excretion it produces marked irritation of the kidneys and urinary tract. Small doses are given in cystitis, incontinence of urine, and gleet. For internal administration, tincture of cantharides is the only preparation used. For external application the powdered beetles are used in *Emplastrum Calefaciens*, *Emplastrum Cantharidis*, and *Unguentum Cantharidis*. The first plaster mentioned is a "warming" plaster, not tending to blister the skin, but only to cause slight redness. *Emplastrum Cantharidis* will raise a blister in a few hours. *Unguentum Cantharidis* will not blister of itself, but will promote discharge from a blister already produced. For application to surfaces where plasters cannot readily be used, *Liquor Epispasticus* and *Collodium Vesicans* are of service. The preparations of cantharides are very common ingredients of stimulating hair-washes, the vinegar and tincture being those most frequently used. The former is preferable in acid washes, the tincture for combination with ammonia. All these preparations owe their activity to the crystalline lactone, cantharidin. In cases of poisoning by cantharides, the same treatment should be adopted as in cases of poisoning by cantharidin.

**Dose.**—5 to 30 milligrams ( $\frac{1}{12}$  to  $\frac{1}{2}$  grain).

**NOTES.**—This drug is not often adulterated, but occasionally the rose beetle (*Cetonia aurata*, Lind.) is found mixed with cantharides. This, though similar in colour, is easily distinguished by being much broader. Admixture with beetles deprived of their cantharidin may be detected by determining the proportion of this substance and of the fat; the latter should not be less than 10 per cent. Two species of blistering beetles, viz., *Mylabris Sida*, Fab., and *M. cichorii*, Fab., are regularly imported from China in considerable quantities, and known as Chinese blistering flies. They are readily recognised by their black wing-cases traversed by three broad yellow bands. These two species, which are very similar in appearance, contain more cantharidin than the official, viz., from 0.75 to 1.0 per cent. They are used as a source of cantharidin, but may not be substituted for the European drug in making official galenical preparations. Corresponding preparations are prepared, however, from *mylabris*, for use in India and the African and Eastern Colonies (see *Mylabris*).

## CAOUTCHOUC.

## CAOUTCHOUC.

*Synonyms.*—Elastica ; Indiarubber ; Para Rubber.

Caoutchouc consists of the prepared latex of *Hevea brasiliensis* Muell. Arg. (N.O. Euphorbiaceæ), and probably other species indigenous to Brazil ; and is known commercially as pure Para rubber. The latex is obtained from the tree by incisions into the bark of the trunk, and coagulated in successive layers on a wooden paddle, by dipping this instrument in the latex and holding it for a few moments in the smoke of burning palm nuts. The coagulated latex is then cut from the paddle, and hung up to dry.

Para rubber is imported in flat, elastic masses of varying size, brownish-black externally, paler internally, exhibiting a number of thin layers separated by dark lines. By keeping, it gradually darkens in colour and slowly loses its elasticity. It has a characteristic odour, and is nearly devoid of taste. When heated to 125° it melts, and remains soft and adhesive after cooling. Para rubber is insoluble in water, alkalies, or dilute acids. Chloroform, oil of turpentine, carbon bisulphide, and benzol, however, have the effect of making it swell and become soft and gelatinous ; it is probable that one constituent of the rubber thus passes into solution, while the other remains undissolved, but in a more or less disintegrated condition.

Good Para rubber consists of the hydrocarbon caoutchouc, which is associated with small quantities (1 to 4 per cent.) of various impurities, such as resin, fat, colouring matters, and mineral substances. Pure caoutchouc is a white amorphous substance with the empirical formula  $(C_{10}H_{16})_n$ , and appears to be an isomer of gutta. When subjected to dry distillation, it yields "oil of caoutchouc"—a mixture of hydrocarbons, including isoprene, caoutchine, and heveene.

Caoutchouc is a constituent of the basis for self-adhesive plasters, with which medicaments, such as zinc oxide, belladonna, capsicum, etc., are incorporated. Liquor Caoutchouc is a solution of indiarubber in benzol and carbon bisulphide ; mixed with powdered mustard seed (freed from fixed oil) it forms Charta Sinapis. Solutions of gutta percha are much to be preferred to those of indiarubber for the application of such medicaments as chrysarobin and resorcin to the skin where close and prolonged contact is required. The indiarubber film is moist and sticky, that of gutta percha dry and hard.

NOTES.—Commercially, indiarubber is obtained from many other plants growing in tropical climates. In Central America, Ecuador, and Peru it is obtained from *Castilloa elastica*, Cerv. (N.O. Urticaceæ), and other species of *Castilloa* ; in Madagascar, from species of *Landolphia* (N.O. Apocynaceæ) ; in Mangabeira, from *Hancornia speciosa*, Gomez (N.O. Apocynaceæ) ; in Africa, from *Funtumia elastica*, and species of *Landolphia*. The coagulation is effected by different methods, according to the nature of the latex. In the inferior varieties of rubber the amount of resin present may vary from 10 to 40 per cent.



**CAPSI CI FRUCTUS.**

## CAPSICUM FRUIT.

*Synonyms.*—Capsicum; Chillies.

Capsicum fruit is the dried ripe fruit of *Capsicum minimum*, Roxb. (N.O. Solanaceæ), a small, erect shrub, indigenous to Southern India, and cultivated in Africa (Sierra Leone and Zanzibar), South America, and other tropical countries.

The fruits are of a dull, orange-red colour, and oblong-conical shape; obtuse at the apex, and varying in length from 12 to 20 millimetres, but not exceeding 6 millimetres in diameter. A small inferior, inconspicuous five-toothed calyx, and long, straight, slender peduncle often remain attached. The pericarp is glabrous, shining, thin, and leathery, more or less completely translucent, and shrivelled. The cavity of the fruit is divided by a thin membranous dissepiment into two cells, each of which contains from five to ten small, flat, nearly circular whitish seeds, with a characteristic thickened margin. The drug has an extremely pungent, fiery taste. The outer epidermis of the pericarp of capsicum fruit consists of rectangular cells, with straight, thick, yellow, sparsely pitted walls, abutting on parenchymatous tissue, the cells of which contain droplets of red oil, and have thin cellulose walls. The inner epidermis exhibits groups of sclerenchymatous cells, alternating with bands of thin-walled parenchymatous cells, the whole forming a very characteristic tissue. The epidermis of the seed is composed of very large, sinuous cells, with thin outer walls, but strongly thickened and pitted radial and inner walls.

The chief constituent of capsicum fruit is the crystalline pungent principle, capsaicin,  $C_{18}H_{28}NO_3$  (or, according to Thresh,  $C_7H_{14}O_2$ ), of which about 0.02 per cent. is present, chiefly in the dissepiment which divides the fruit into two cavities, as it is secreted by the outer walls of the epidermal cells of this. It melts at  $63^\circ$ , and is volatile at higher temperatures, the vapour being extremely irritating. The fruit also contains a fixed oil, red colouring matter, and a liquid alkaloid, none of which is pungent. It yields from 20 to 25 per cent. of alcoholic extract, and contains from 1 to 1.5 per cent. of starch. On incineration powdered capsicum fruit should yield not more than 6 per cent. of ash, indicating freedom from adulteration with inorganic substances.

Capsicum fruit is given internally as a powerful stimulant and carminative to the alimentary canal, especially in dyspepsia and flatulence. Externally, capsicum is an irritant, producing warmth, redness, and vesication. It is used in rheumatism, lumbago, neuralgia, and generally where counter-irritation is indicated. For internal use, tincture of capsicum is used generally with bitters and tonics; it is sometimes added to tannin or rose gargles for pharyngitis and relaxed sore throat. Some dipsomania cures contain capsicum, cinchona, and nux vomica. When its pungent taste is objectionable, powdered capsicum can be dispensed in pill form,

with compound rhubarb pill or reduced iron. The tincture is too weak for external use: for this purpose a strong tincture is prepared (*Tinctura Capsici Fortior*), and a liniment. These are used by painting on the skin or sprinkling on lint or spongio-piline, and applying to the part. An ointment of capsicum is prepared for rubbing over joints. Capsicum wool has been found of service as an application to the chest; it has a mild rubefacient action on the skin. Capsicum plasters are prepared in several forms: very small plasters on very thin felt for application to the gums as a counter-irritant; capsicum plasters with a soap basis prepared with oleo-resin of capsicum, and the same, self-adhesive, in rubber combination for application to the back, chest, or wherever counter-irritation may be required.

*Dose*.—3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

*Notes*.—The official capsicum fruit (chillies) is identified by its small size, dull orange red colour, long slender straight peduncle and small calyx. The fruit of *C. annuum*, Linn., which is imported from India in numerous varieties, and known in commerce as capsicums, is larger, has a thicker curved peduncle and a dissepiment which often does not extend to the apex of the fruit. Japanese chillies are much brighter in colour than the official fruit, more carefully freed from calyx and peduncle, and less pungent. They are largely used for preparing the powdered cayenne pepper of trade, but should not be substituted for the official, as they are not derived from the same plant (compare their histological characters). Powdered capsicum is distinguished from the powdered chillies by the characters of the epidermis and hypodermis of the pericarp. In powdered capsicum the epidermal cells are larger and irregularly polygonal with evenly thickened walls traversed by numerous well-marked pits. Below the epidermis are several rows of cuticularised collenchymatous cells. Powdered Japanese chillies possess epidermal cells with strongly thickened walls and radiate cavities, and the cuticle is not visibly striated. Below the epidermis there is a hypodermis consisting of a single layer of polygonal cells with rather thick, beaded, cuticularised walls.

## CAPSULÆ.

### CAPSULES.

Capsules are used for enclosing medicaments for internal use, when it is desired to disguise their taste. The following formula yields a mass for flexible capsules, which is suitable for all ordinary purposes:—

Gelatin, of good quality, in thin sheets	...	28·00
Syrup	... ..	8·00
Glycerin	... ..	20·00
Distilled Water, sufficient to produce	...	100·00

Mix the syrup, glycerin, and water, and soak the gelatin in the mixture; when the gelatin has become uniformly soft, melt on a water-bath. If a harder capsule be required, a portion of the glycerin may be omitted or replaced by syrup. Mucilage of gum acacia is sometimes used in preparing the capsule mass, as in the following process:—Mix 4 each of syrup and mucilage, 7 of glycerin, and 30 of water; soak in the mixture 16 of gelatin till soft, then melt on a water-bath.

The capsule moulds are oval in shape, and may be made of tin, brass, or aluminium. The stems of the moulds are about 5 centimetres (2 inches) long, and are fixed to one side of a circular or square, wooden or metal carrier; to the centre of the other side of the carrier is fixed a stout handle. The sizes of capsules in common use are 2, 3, 6, 9, 12, 18, 35 and 53 decimils (3, 5, 10, 15, 20, 30, 60 and 90 minims), and it is convenient to have all the moulds on each carrier of the same size. In making the capsules, the mass is brought to a suitable consistence on a water-bath (if too hot the capsules will be too thin, and if too cold they will be unnecessarily thick), and the surface layer, if necessary, is removed or drawn to one side; the moulds are then wiped with a piece of cloth permeated with almond or olive oil, and dipped into the melted mass till they are well under the surface. They are then slowly withdrawn and rotated till the gelatin sets. When cold the capsules are drawn from the moulds with the fingers, and, to facilitate closing, are then trimmed with a knife or scissors so as to leave a short length of neck.

In filling the capsules the method adopted is determined by the nature of the material employed. In the case of a dry powder, the empty capsule is simply stretched over a small glass or metal funnel fixed at a convenient height, and the weighed quantity of powder shot into the capsule, and, if necessary, pressed down with a wooden plunger. In most cases, however, the material to be capsuled is made into a mass of semi-fluid or pasty consistence. The excipient used for this purpose must have no action on the gelatin; if water or glycerin be present the amount must be very small. Almond or olive oil and wool fat are sometimes suitable, but liquid or soft paraffin or a mixture of both is the most satisfactory excipient in almost every case. Liquid extracts are generally capsuled so that a 6-decimil (10-minim) capsule represents 2 mils (30 minims) of the normal extract. The extract is prepared without spirit, concentrated to between a fourth and a third of its volume, and made up to a third with a mixture of liquid and soft paraffins. With this admixture the extract is much more easily worked, and does not readily clog the syringe. Certain limpid liquids are conveniently capsuled by means of a syphon of rubber tubing, terminated by a pointed glass nozzle fixed at a convenient height, the flow being controlled by a spring or screw-clip, but fluids like castor oil and materials of a semi-fluid or pasty consistence are forced through a nozzle of the required calibre. There are various devices for applying the pressure, but the simplest arrangement is an ordinary glass syringe (the nozzle being drawn out in a gas flame, and cut so as to leave a point of suitable bore) clamped at a convenient height, when the capsule to be filled can be held under the nozzle with one hand, while the piston-rod is manipulated with the other. The filled capsules are placed in trays having cup-shaped holes or carrying pill-boxes of suitable sizes, and may be conveniently closed by heating a metal bolt in a small quantity of the



capsule mass thinned down by the addition of a little water and applying to the mouth of the capsule. The bolt may conveniently be the size and shape of a 10 or 12 decimil (15 or 20 minim) mould, and when applied to the mouth of a capsule carries sufficient heat to fuse the lips and sufficient gelatin mass to close the capsule. On exposure to air the capsules become drier and firmer, but are permanently flexible.

A recent form of capsule is made from two sheets of tough, gelatinous material. They are known as perles, and may be made spherical like pills, flat like tablets, or oval like the ordinary soft capsule. They are made and filled at the same time, but expensive and complicated machinery is required, which places their production beyond the domain of the ordinary retail pharmacist. Another capsule of American origin sometimes used is cylindrical or cup-shaped, and closed by a lid of the same material and shape which fits tightly over the open end of the capsule; it is not suitable for liquids. Gelatin capsules are sometimes required to pass through the stomach undissolved, and to release their contents in the intestine. For this purpose they may be coated with solution of keratin, or they may be dipped in solution of formaldehyde; when prepared by the latter process they are known as "Glutoid" capsules.

## CARBASUS ABSORBENS.

### ABSORBENT GAUZE.

Absorbent gauze consists of open-weave cotton gauze or mulls prepared from cotton deprived of its natural oil. Absorbent gauze for surgical purposes is soft, free from dressing, and freely absorbs water. The count of its mesh both on the warp and the weft varies from 16 to 24 per linear inch ( $2\frac{1}{2}$  centimetres). The gauze should be free from starch and gum-like matters. One gramme when incinerated should yield practically no residue.

Selvage absorbent ribbon gauze is prepared on reels or, better, in sterilised bottles from  $\frac{1}{4}$  inch to 2 inches in width. Ribbon gauzes are used for packing cavities, as the edges do not fray.

## CARBASUS ABSORBENS ASEPTICA.

### ASEPTIC ABSORBENT GAUZE.

Aseptic absorbent gauze is prepared by enveloping absorbent cotton gauze in loose rolls of any suitable size in closely woven calico, then placing them in the chamber of a steam vacuum autoclave, and submitting them to steam under a pressure sufficient to produce a temperature of  $115^{\circ}$  to  $121^{\circ}$ , for thirty minutes. The dressing is allowed to remain in the chamber till cold and dry, then removed, and immediately packed in sterilised parchment paper.

NOTE.—The operator should wear sterilised gloves whilst packing this gauze.

**CARBASUS ACIDI BORICI.****BORIC ACID GAUZE.**

Absorbent Gauze	...	...	...	...	100'00
Saturated Solution of Boric Acid, boiling	} of each a sufficient quantity.				
Aniline Red	...	...	...	...	

Immerse the gauze in the solution of boric acid tinted with aniline red, remove and press the gauze until it weighs 300, then dry. The product contains approximately 40 to 45 per cent. of boric acid.

Selvedge boric ribbon gauze is prepared from  $\frac{1}{4}$  inch to 2 inches in width.

**CARBASUS ACIDI CARBOLICI.****CARBOLIC ACID GAUZE.**

*Synonym.*—Phenol Gauze.

Carbolic Acid	...	...	...	...	10'00
Resin	...	...	...	...	40'00
Paraffin Wax	...	...	...	...	40'00
Absorbent Gauze	...	...	...	...	90'00

Melt together the carbolic acid, resin, and wax on a water-bath, saturate the gauze with the mixture, and press between warm metal plates, so that the gauze is evenly saturated. The above gauze when freshly made contains approximately 5 per cent. of carbolic acid.

Carbolic acid gauze is frequently used in the form of bandage, 2 inches to 6 inches in width.

NOTE.—Carbolic acid gauze must be kept in air-tight vessels as the gauze quickly loses its strength on exposure.

**CARBASUS ALUMINII ACETATIS.****ALUMINIUM ACETATE GAUZE.**

Aluminium Acetate	...	...	...	...	3'00
Absorbent Gauze	...	...	...	...	97'00
Distilled Water	...	...	...	...	97'00

Dissolve the aluminium acetate in the water, saturate the gauze with the solution, and dry. The strength of the medicated gauze is approximately 3 per cent.

**CARBASUS HYDRARGYRI PERCHLORIDI.****MERCURIC CHLORIDE GAUZE.**

*Synonym.*—Sublimate Gauze.

Solution of Mercuric Chloride (1 in 1,000)	...	...	...	...	100'00
Absorbent Gauze	...	...	...	...	100'00

Soak the gauze in the solution of mercuric chloride so that the solution is equally distributed and absorbed in the gauze and dry.

NOTES.—Mercuric chloride gauze must be kept in well-closed vessels. The mercuric chloride in the above soon undergoes decomposition; usually about a month or six weeks after it is made no mercuric salt can be found; a mercurous salt is, however, present. On account of this defect sal alembroth gauze has replaced it largely.

**CARBASUS HYDRARGYRI ET ZINCI CYANIDI.****MERCURY AND ZINC CYANIDE GAUZE.***Synonym.*—Cyanide Gauze.

Double Cyanide of Mercury and Zinc	...	3'00
Solution of Mercuric Chloride (1 in 4,000)	...	200'00
Absorbent Gauze	... ..	97'00
Aniline Violet, a sufficient quantity.		

Diffuse the cyanide of mercury and zinc in the solution of perchloride of mercury, and colour lightly with aniline violet. Place the gauze in the mixture, agitating, so that the insoluble powder is equally diffused over the gauze. When the whole of the mixture is absorbed dry the gauze.

Selvedge cyanide gauze is prepared from  $\frac{1}{4}$  inch to 2 inches in width.

NOTES.—Cyanide gauze must be kept in well-closed vessels. In consequence of the uncertain composition of the so-called double cyanide of mercury and zinc, and the further changes it undergoes by contact with water and exposure during the process of drying, these dressings cannot be relied on as of definite 3 per cent. strength. During the drying hydrocyanic acid is evolved, and carbonate of zinc formed.

**CARBASUS IODOFORMI.****IODOFORM GAUZE.**

Iodoform	... ..	10'00
Ether (specific gravity, 0'720)	... ..	80'00
Absorbent Gauze...	... ..	90'00

Dissolve the iodoform in the ether, ~~add the glycerin~~, shake -thoroughly, and pour the mixture on the gauze under pressure; when the whole of the liquid is absorbed and equally diffused, remove the gauze, and allow the ether to evaporate in a current of air. The product contains approximately 10 per cent. of iodoform.

Gauze containing approximately 20 per cent. of iodoform may be prepared as above, using only 40 of gauze. It should be noted that iodoform gauze can only be considered as approximating to 10 or 20 per cent. strength, even when freshly made, and will then yield on analysis about 9 or 19 per cent. of iodoform respectively. The loss which occurs is due in part to evaporation of the iodoform whilst drying, and in part to mechanical loss during manufacture. Unless the gauze is well and closely packed it soon loses more iodoform, and the loss is proportionate to its age and the amount of exposure it has had.

Selvedge iodoform ribbon gauze is prepared from  $\frac{1}{4}$  inch to 2 inches in width.

NOTES.—Iodoform gauze must be kept in well-closed vessels. Iodoform gauzes, especially ribbon gauzes, are sometimes adulterated by dyeing them yellow. This is done to give a false appearance of strength, also to cover defective distribution of the iodoform. The adulteration can usually be



detected by moistening portions of the suspected sample with alcohol or with water; on squeezing out the fluids they are coloured yellow. If picric acid has been used as the dye, a spot of *Liquor Sodæ* gives a red-brown colour to the dressing.

### CARBASUS IODOFORMI CUM GLYCERINO.

IODOFORM GAUZE WITH GLYCERIN.

*Synonym.*—Moist Iodoform Gauze.

Iodoform	...	...	...	...	10'00
Glycerin...	...	...	...	...	10'00
Ether (specific gravity, 0'720)	...	...	...	...	80'00
Absorbent Gauze	...	...	...	...	80'00

Dissolve the iodoform in the ether, add the glycerin, shake thoroughly, and pour the mixture on the gauze under pressure; when the whole of the liquid is absorbed and equally diffused, remove the gauze, and allow the ether to evaporate in a current of air.

NOTE.—This gauze must be kept in well-closed vessels. See the notes under *Carbasus Iodoformi*.

### CARBASUS SAL ALEMBROTH.

SAL ALEMBROTH GAUZE.

Alembroth Salt	...	...	...	...	1'00
Absorbent Gauze	...	...	...	...	99'00
Distilled Water	...	...	...	...	100'00
Aniline Blue, a sufficient quantity.					

Dissolve the alembroth salt in the water, and tint with the blue. Place the gauze in the solution, press until it is evenly saturated and has absorbed all the solution, and dry. The strength of the product is approximately 1 per cent., but as some authorities consider this too strong and irritating, a gauze of half the strength is often used.

Selvedge sal alembroth ribbon gauze is prepared from  $\frac{1}{4}$  inch to 2 inches in width. Sal alembroth gauze bandages are from 2 inches to 6 inches in width.

NOTE.—Gauze of sal alembroth must be kept in well-closed vessels.

### CARBASUS STYPTICA.

STYPTIC GAUZE.

*Synonym.*—Tarred Gauze.

Stockholm Tar	...	...	...	...	5'00
Resin	...	...	...	...	3'00
Benzol	...	...	...	...	80'00
Absorbent Gauze	...	...	...	...	92'00

Dissolve the tar and resin in the benzol, allow to stand for twenty-four hours, decant the clear liquid, and saturate the gauze with it. Dry the gauze in a steam chamber where there is a good current of air. The strength of the product is approximately 5 per cent.

**CARBASUS ZINCI SULPHITIS.**

ZINC SULPHITE GAUZE.

Zinc Sulphate ...	...	...	...	...	6.5
Sodium Sulphite ...	...	...	...	...	5.5
Absorbent Gauze ...	...	...	...	...	100.00
Distilled Water ...	...	...	...	...	200.00

Dissolve the salts separately in warm distilled water, mix and add sufficient water to produce 100. Slightly colour the solution with gentian violet, immerse the absorbent gauze in the coloured liquid, and press it so that the whole of the mixture is evenly absorbed. Now submit the gauze to strong pressure to remove the sodium sulphate formed, immerse in distilled water, 100, and again press to remove sodium sulphate, then dry. The strength of the medicated gauze is approximately 5 per cent.

**CARBO ANIMALIS.**

ANIMAL CHARCOAL.

*Synonym.*—Boneblack.

Animal charcoal is prepared by heating bones without access of air, and consists chiefly of calcium phosphate and other inorganic constituents of bone, with about one-tenth its weight of carbon, and a certain amount of nitrogen in a very firm state of combination.

It occurs in dull black granular fragments, or as a dull black powder, without odour, insoluble in water or alcohol. After drying, at 120° to constant weight, about 85 per cent. of ash is left on incineration. Boiled with diluted potassium hydroxide solution and filtered, the filtrate should be almost or quite colourless (evidence of complete carbonisation). It is much more effective as a decolourising agent than wood charcoal.

Animal charcoal is used in pharmacy and the arts for decolourising syrups, solutions of vegetable principles, etc., its decolourising power being in direct proportion to the amount of combined nitrogen it contains. As acid solutions dissolve some of the contained calcium salts, purified animal charcoal should be used to decolourise acid mixtures. The solution to be decolourised is shaken with the charcoal, and allowed to stand some time before filtration.

**CARBO ANIMALIS PURIFICATUS.**

PURIFIED ANIMAL CHARCOAL.

Purified animal charcoal is prepared by boiling animal charcoal twice with hydrochloric acid, washing thoroughly and drying.

It occurs as a dull black, odourless, tasteless powder, insoluble in water, alcohol, or other solvents, and should not yield any colour to boiling dilute potassium hydroxide solution. It is liable to contain an excess of water; not more than 10 per cent. should be permitted. It is very difficult, if not impossible, to prepare samples yielding less than 15 per cent. of ash on the dried substance. Good commercial samples yield less than 20 per cent., and this may be considered as satisfactory.

Purified animal charcoal is used to decolourise syrups and solutions before filtration (see *Carbo Animalis*).

**CARBO LIGNI.**

WOOD CHARCOAL.

*Synonym.*—Charcoal.

Wood charcoal consists of the carbonaceous residue of wood charred by exposure to a red heat without access of air, the wood of the beech, oak, poplar, hazel, and willow being chiefly used for the purpose. The yield of charcoal is from 17 to 18 per cent. when the wood is simply protected from the air with earth and sods, and from 22 to 23 per cent. when charred in iron cylinders.

It occurs as a black, tasteless and odourless powder, free from gritty matter. When freshly prepared it is capable of absorbing 12 to 14 per cent. of water if exposed to the air. When heated to a high temperature with free access of air, it should not leave more than 7.5 per cent. of ash, and may leave less, the quantity varying with the kind of wood from which it is prepared. Charcoal usually contains inorganic matter from the wood, but can be freed from this by digestion with diluted hydrochloric acid and subsequent washing with boiling water.

Dry charcoal has the power of absorbing and condensing gases, especially oxygen, but it loses this property when thoroughly wetted. It contains no combined nitrogen, and is therefore useless as a decolourising agent. It is used internally as an antiseptic and absorbent, in flatulent dyspepsia, intestinal distension, diarrhoea, and dysentery. Its action is mainly mechanical, removing mucus and stimulating the movements of the stomach and intestine. Externally, charcoal is absorbent and deodorant. It is sometimes employed as a poultice for fœtid ulcers, some of the charcoal being spread on the surface of the poultice to retain its oxidising properties. In powder form it is usually dispensed in cachets, sometimes with sodium bicarbonate, bismuth carbonate, and beta-naphthol. Lozenges of charcoal and charcoal with bismuth are prepared. Charcoal biscuits are a popular form of administration. Charcoal tooth-powders may contain from 25 to 75 per cent. of wood charcoal.

*Dose.*—4 to 8 grammes (60 to 120 grains).

*NOTES.*—The proprietary French charcoals are prepared generally from young poplar shoots. Willow charcoal is most commonly used in this country.

**CARBONIS BISULPHIDUM.**

CARBON BISULPHIDE.

 $\text{CS}_2 = 76.12.$ 

*Synonyms.*—Carbonei Disulphidum; Carbon Disulphide; Alcohol Sulphuris.

Carbon bisulphide,  $\text{CS}_2$ , is formed by passing the vapour of sulphur over red-hot carbon and subsequently purifying.

It occurs as a clear colourless limpid liquid, highly refractive, with a characteristic rather pleasant ethereal odour when pure, but usually disagreeable from the presence of impurities. It should not have a fetid odour. It has a sharp, aromatic and cooling taste. Specific gravity, 1.268 to 1.269 (about 1.256 to 1.257 at 25°). Boiling-point, 46° to 47°. Almost insoluble in water (about 1 in 500); readily



soluble in alcohol, ether, chloroform, and the fixed or volatile oils. It is a good solvent for indiarubber, iodine, phosphorus, sulphur, etc. Very volatile and inflammable. It should not affect moistened litmus paper, and should contain no free sulphur or hydrogen sulphide. It decomposes on exposure to light.

The principal use of carbon bisulphide in pharmacy is as a solvent of phosphorus and indiarubber. The vapour is sometimes applied locally to the skin for neuralgia, and to enlarged glands. For this purpose cotton wool placed in a wide-mouth bottle is saturated with the liquid, and the mouth of the bottle placed in contact with the part for a few minutes at a time. In chronic poisoning by carbon bisulphide symptoms of peripheral neuritis are present.

NOTE.—Carbon bisulphide should be kept in well-stoppered bottles in the dark.

## CARDAMOMI SEMINA.

### CARDAMOM SEEDS.

*Synonyms.*—Cardamomum; Cardamoms.

Cardamom seeds are the dried ripe seeds of *Elettaria Cardamomum*, Maton (N.O. Scitamineæ), a plant growing wild in the forests of Southern India, and cultivated on the Malabar coast, and in Ceylon. The plant produces small, inferior, capsular fruits, which are collected as they ripen, and dried. They are then trimmed, graded, and often bleached to improve their appearance. The following are the chief commercial varieties of cardamom fruits:—(a) Mysore, forming the bulk of the imports; these are ovoid in shape, vary from 10 to 20 millimetres in length, and have a pale cream, nearly smooth surface. (b) Malabar; these are smaller, shorter, and plumper, and often not so smooth as the foregoing. (c) Mangalore, which closely resemble Malabar fruits, but are usually almost globular, rather larger, and often have a roughish, almost scurfy coat. (d) Ceylon wild or native, the fruits of *E. Cardamomum*, var. *B. major*, Smith; these are a regular article of commerce, and are readily distinguished by their elongated shape, shrivelled appearance, and rather dark greyish-brown colour. The official description agrees most closely with the Mysore variety, though Malabar or Mysore cardamoms might be accepted.

The fruit varies from 1 to 2 centimetres in length. It is of a pale buff or yellowish colour, oblong or ovoid in shape, shortly beaked, triangular in section, and three-celled, each cell containing two rows of small seeds which frequently remain compacted together. The ripe seeds are of a very dark reddish-brown colour, and very hard; they are about 3 millimetres long, irregularly angular in shape, and transversely rugose, with depressed hilum and raphe. Each seed is covered with a thin transparent colourless aril, which becomes more evident when the seed is moistened. Cardamom seeds have an agreeable aromatic odour and taste, which is not shared by the pericarps.

The epidermis of cardamom seeds consists of long narrow tapering cells, with walls about 3 to  $4\mu$  thick, and is separated by two rows of parenchymatous cells from a single continuous layer of large oil-cells. The inner integument of the seed-coat consists of a single row of prismatic brown cells, about  $40\mu$  long and  $20\mu$  wide, the walls of which are so strongly thickened as to leave only a small triangular cavity at the apex, which is filled with a nodule of silica. The cells of the endosperm are packed with minute starch grains, and in the centre there are one or more small prismatic crystals of calcium oxalate; the endosperm contains proteid granules, but no starch.

The principal constituent of cardamom seeds is volatile oil, of which they contain about 5 per cent.

Powdered cardamom seeds, on account of their carminative properties, are prescribed with purgatives, as in *Extractum Colocynthis Compositum*, and with other aromatics, as in *Pulvis Cinnamomi Compositus*, and *Pulvis Cretæ Aromaticus*. *Tinctura Cardamomi Composita* is the most commonly used cordial and flavouring agent. Combined with cinnamon, cloves, caraway, and ginger, cardamom seeds are contained in *Tinctura Carminativa*, a more aromatic preparation than the compound tincture of cardamoms of the same class.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

*NOTES.*—Ceylon wild cardamom seeds are distinguished by their bitterish taste, different odour, and, microscopically, by the thicker walls of the epidermal cells ( $4.5$  to  $6.0\mu$ ). Other varieties come from time to time into the market, but are not regularly imported. Powdered cardamom seeds may be identified microscopically by the characteristic cells of the epidermis, and of the inner (sclerenchymatous) integument, as well as by the masses of minute starch grains from the perisperm, with embedded crystals of calcium oxalate. The powdered fruit is distinguished from the powdered seed by the presence of spiral vessels and elongated sclerenchymatous cells and fibres, as well as abundant empty parenchymatous cells. Powdered Ceylon wild cardamom seeds may be identified by the greater thickness of the walls of the epidermal cells. Powdered cardamom seeds of good quality yield not more than 6 per cent. of ash.

## CARMINUM.

### CARMINE.

Carmine is a brilliant red colouring matter prepared from cochineal, either by precipitating an aqueous infusion with alum, or by extracting with diluted sodium carbonate solution and adding white of egg and sulphuric acid.

It occurs in light, bright red pieces, which can readily be reduced to powder. Insoluble in water and dilute acids. Carmine contains about 50 per cent. of carminic acid, and should not leave more than 9 per cent. of ash, consisting chiefly of calcium and aluminium oxides. Pure carmine gives on heating an odour of burnt feathers. It should dissolve readily in dilute ammonia, leaving only a slight residue of aluminium hydroxide. It may be compared with a pure standard specimen by rubbing weighed quantities of each with

definite weights of starch and noting the depth of colour produced (about 1 decigram to 10 grammes of starch is a suitable quantity).

Carmine is used to colour ointments, tooth-powders, tooth-washes, dusting-powders, and other pharmaceutical preparations. If used in solid form prolonged trituration with powder is necessary to obtain a good colour and even distribution. To obtain the maximum of colour the carmine should be dissolved in a small quantity of strong solution of ammonia and triturated with the powder. A good solution for colouring neutral or alkaline mouth-washes and mixtures is Liquor Carmini, an ammoniacal aqueous solution, of which 3 or 4 drops to the fluid ounce of liquid is sufficient. The colouring matter of Liquor Carmini is precipitated in acid solutions. Carmine is much used in the staining of histological specimens; it is less fugitive than the aniline colours.

NOTES.—Carmine should not be exposed to light. It is sometimes adulterated with inorganic matter (*e.g.*, aluminium oxide or barium sulphate), or with aniline dyes.

## CARUI FRUCTUS.

### CARAWAY FRUIT.

*Synonyms.*—Carum; Caraways.

Caraway fruit is the dried ripe fruit of *Carum Carvi*, Linn. (N.O. Umbelliferae), a biennial plant indigenous to, and cultivated in, Europe, chiefly in Holland.

In the drug, as met with in commerce, the two mericarps of which the fruit consists are usually separate. They are curved and taper towards each end, dark brown in colour, glabrous, and traversed longitudinally by five yellowish filiform ridges. The transverse section is almost equilaterally pentagonal, and exhibits six small vittæ, four on the dorsal and two on the commissural surface. The drug has an agreeable aromatic odour, due to the volatile oil it contains.

The chief constituent of caraway fruit is the volatile oil, of which good caraways contain from 5 to 7 per cent. The oil is distilled chiefly from Dutch, Norwegian, and Russian fruits. The Dutch are small and dark brown in colour; English fruits, of which only a small quantity is produced, are of a brighter tint. Some varieties contain much impurity in the form of stalks, dust, dirt, etc.

The aromatic properties of caraway fruit, due to its volatile oil, are utilised for combination with purgatives, as in Tinctura Sennæ Composita and Pilula Aloes Barbadosensis. Distilled caraway water is a useful remedy in the flatulent colic of infants, and is an excellent vehicle for children's medicines; when sweetened its flavour is agreeable.

NOTES.—Good caraways yield about 6 per cent. of ash. Entire fruits are sometimes used for the distillation of the oil; in this case the whole of the volatile oil is not distilled off, and the yield is smaller, but the residual fruits may be dried and sold for various purposes. Such fruits may be recognised by their dark colour, shrivelled appearance, want of aroma, and low yield of aqueous extract (less than 15 per cent.).



**CARVACROL.**

CARVACROL.



Carvacrol, or isopropyl-o-cresol,  $\text{C}_6\text{H}_3\text{CH}_3(\text{OH})$ ,  $(\text{C}_3\text{H}_7)$  [1.2.4], the principal constituent of true oil of origanum, from *Origanum hirtum* and *O. smyrnæum*. It may be prepared from carvone by treatment with acids, and also by heating camphor with iodine.

It occurs as a thick colourless oil, which solidifies when cooled to a low temperature. Melting-point,  $0.5^\circ$ . Boiling-point, about  $240^\circ$ . Specific gravity, 0.980 to 0.983.

Carvacrol is a powerful antiseptic. An iodide in the form of a light yellow or brownish powder has been prepared as a substitute for iodoform.

**CARVONUM.**

CARVONE.



Synonym.—Carvol.

Carvone,  $\text{C}_{10}\text{H}_{14}\text{O}$ , is a ketone contained in caraway, dill, and spearmint oils. That occurring in caraway and dill oils is dextro-rotatory, that from spearmint oil is lævo-rotatory. Pure carvone is separated from the oil by passing sulphuretted hydrogen into an alcoholic solution of the oil saturated with ammonia gas; crystals of an addition compound,  $\text{C}_{10}\text{H}_{14}\text{OH}_2\text{S}$  are formed, purified by recrystallisation from methyl alcohol, and subsequently decomposed by alcoholic potash. Commercial carvone is usually obtained by the fractional distillation of oil of caraway.

It occurs as a thickish, colourless, or slightly yellow liquid, with an odour of caraways. Specific gravity, 0.963 to 0.966. Boiling-point,  $224^\circ$ . A 100-millimetre tube rotates the plane of polarised light  $62^\circ$  to the right. It is miscible with all proportions of alcohol, soluble in 70 per cent. alcohol (1 in 2) and in 50 per cent. alcohol (1 in 20). Carvone containing 2 per cent. of limonene will not form a clear solution under these conditions. Mixed with an equal volume of alcohol it gives a violet colour with a drop of very dilute ferric chloride solution, the colour disappearing on adding excess of the reagent.

Carvone has the aromatic and carminative properties of oil of caraway.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

*Notes.*—Pure carvone solidifies at low temperatures. It forms a liquid addition product with hydrochloric acid, and a solid compound with hydrobromic acid. Heated with sulphuric acid, hydrochloric acid, phosphoric acid, zinc chloride, or alkalis, it is converted into the isomeric carvacrol ( $\text{C}_6\text{H}_3\text{CH}_3\text{OHCH}_3\text{H}_7$ ). Potassium permanganate oxidises it to oxyterpenylic acid ( $\text{C}_8\text{H}_{12}\text{O}_5$ ). It differs from other ketones in not being converted into the corresponding alcohol on reduction.

## CARYOPHYLLUM.

## CLOVES.

*Synonym.*—Caryophyllus.

Cloves are the dried flower-buds of *Eugenia caryophyllata*, Thunb. (N.O. Myrtaceæ), an evergreen tree indigenous to the Molucca Islands, and cultivated there as well as on the Malay Peninsula, in Zanzibar and Pemba, Java, etc. As the buds develop they assume a green and then crimson colour, when they are collected and dried. During the drying the crimson colour changes to a reddish-brown.

The dried buds are about 15 millimetres long, and of a rich, reddish-brown colour. Each consists of a fleshy sub-cylindrical lower portion crowned by four thick calyx teeth, and four yellowish-brown imbricated petals; the latter enclose numerous stamens and a short, thick style. The fleshy, lower portion readily yields oil when indented by the finger-nail, and a transverse section exhibits numerous oil glands near the periphery. The calyx and petals also contain oil glands, but they are not so numerous. Cloves of good quality should have a strong aromatic odour and taste; they should be plump and of a bright reddish-brown colour, sink in water and readily exude oil when indented. Powdered cloves should not yield more than 7 per cent. of ash.

The principal constituent of cloves is the volatile oil, of which they should contain from 15 to 20 per cent. They also contain gallotannic acid (13 per cent.) and a crystalline body, caryophyllin, which, however, is odourless, and appears to be a phytosterin.

Cloves are stimulating and carminative to the alimentary canal; they are used in flatulence, dyspepsia, and as adjuvants to other medicines. The medicinal properties of cloves are resident principally in the volatile oil, which may be given on sugar, or in capsules with menthol, peppermint, or creosote. The oil is used to flavour emulsions and is a good carminative to correct the griping action of purgatives, 2 centimils ( $\frac{1}{3}$  minim) being sufficient in each pill. Fresh infusion of cloves contains the astringent matter as well as some of the volatile oil; the infusion and distilled clove water are good vehicles for alkalies and aromatics. Oil of cloves is a powerful antiseptic and preservative; it is applied to decayed teeth as a local anæsthetic.

NOTE.—The stalks upon which the clove buds are borne are also collected and exported in considerable quantities. They are brown and woody, about 1 to 2 millimetres thick and 1 to 3 centimetres long. They yield about 5 or 6 per cent. of volatile oil, which is less agreeably aromatic than that of cloves, although resembling it in specific gravity (1.040 to 1.065, oil of cloves 1.045 to 1.070) and optical rotation ( $[\alpha]_D$  = up to  $1^\circ 10'$ , oil of cloves the same), and containing rather more eugenol. The nearly ripe fruits are also exported under the name of mother cloves: they are dark brown, ovoid, one-seeded berries, crowned by the remains of the calyx teeth. Mother cloves contain but little volatile oil. Both clove stalks and mother cloves have been used to adulterate ground cloves. The former may be detected by the presence of numerous characteristic, nearly isodiametric, sclerenchymatous cells; the latter by the large starch grains which the seeds contain. Blown cloves are those which have been collected after the petals have expanded; both the petals and the stamens have been

broken off, leaving the thick portion of the clove crowned by the somewhat patent calyx teeth. Clove dust often consists largely of the broken stamens, etc.

### CASCARA SAGRADA.

#### CASCARA SAGRADA.

*Synonyms*.—Sacred Bark ; Rhamni Purshiani Cortex.

Cascara sagrada is the dried bark of *Rhamnus purshianus*, DC. (N.O. Rhamneæ), a shrub growing in North California, Oregon, and Washington. It is collected in the spring and early summer, and dried in the shade. It is generally considered that the action of the bark becomes milder and less emetic by keeping ; hence matured bark (three years old) is preferred for pharmaceutical purposes.

The bark occurs in quilled, channelled, or curved pieces, varying considerably in size, but often about 10 centimetres long, 1 to 2 centimetres wide, and 1 to 2 millimetres thick, thin bark being preferred for use in pharmacy. The cork is nearly smooth, dark purplish-brown in colour, and bears scattered lenticels, but in most pieces the cork is more or less completely covered by a whitish coat of lichens ; the inner surface is of a yellowish-brown or dark brown colour, and faintly striated and corrugated. It breaks with a short fracture, which is somewhat fibrous near the inner surface. The transverse section exhibits a narrow purplish cork, a yellowish-grey cortex, in which groups of sclerenchymatous cells may be distinguished, and a brownish-yellow bast, containing wavy, medullary rays. The odour is characteristic, though not powerful ; the taste is nauseous and persistently bitter.

The constituents of the bark are but imperfectly known. It has been proved to contain emodin and an allied substance, possibly identical with the isoemodin of alder buckthorn bark ; fat (2 per cent.), glucose, and a hydrolytic enzyme have also been found in it, as well as a small quantity of a substance yielding, on treatment with acids, syringic acid. Neither chrysophanic acid nor chrysarobin is present. The assertion has been made that the bark contains glucosides which yield by hydrolysis emodin and isoemodin, but the evidence on this point is conflicting. The bitter principle is apparently a lactone, which is converted into less bitter salts by treatment with alkalies ; upon this property the methods of making tasteless liquid extracts are based, but simultaneous loss of activity occurs. The total amount of oxymethylanthraquinones (emodin, isoemodin) present in the bark, or extractable after boiling with dilute sulphuric acid, has been estimated to be from 1·4 to 2 per cent., but although these bodies are laxative, this proportion can scarcely influence the activity of the drug. The principal purgative constituent of cascara bark remains, therefore, still unknown. The drug yields about 5 per cent. of ash, and about 27 per cent. of aqueous extractive.

Cascara sagrada is a mild laxative. It acts principally on the large intestine and empties the rectum, producing no inflammation. It is suitable for delicate and elderly persons, and is a good laxative



in hæmorrhoidal conditions, small repeated doses being preferred in habitual constipation. Liquid extract of cascara is best combined with glycerin, or alkalies, especially aromatic spirit of ammonia; mixtures with mineral acids and salts are often unrepresentable in appearance. Syrupus Cascaræ Aromaticus is a not unpleasant liquid form of extract of cascara; for children a syrup may be prepared with the "tasteless" extract, glycerin, and syrup, flavoured with liquorice. On account of the unpleasant taste of the liquid extract, cascara is very largely used in the solid form. Gelatin capsules are prepared, containing the equivalent of 6 to 30 decimils (10 to 45 minims) of liquid extract in each; they are readily soluble. Tablets contain from 6 to 30 centigrams (1 to 5 grains) of solid extract, and pills are prepared of similar strengths. The latter are best massed with 60 per cent. alcohol, adding a little powdered acacia. Extract of cascara is frequently combined with euonymin, nux vomica, aloin, belladonna, or strychnine, in pill or tablet form.

## CASCARILLA.

### CASCARILLA.

Cascarilla is the dried bark of *Croton Eluteria*, J. J. Bennett (N.O. Euphorbiaceæ), a small tree indigenous to the Bahama Islands.

The bark is imported usually in single quills or channelled pieces, varying from 2.5 to 7.5 centimetres in length and from 4 to 12 millimetres in width, and appears to be the bark of twigs, branches, and small stems. The cork has a characteristic, chalky appearance, due to the presence of crystals of calcium oxalate in the cell-walls, and frequently bears the minute black apothecia of various lichens; it is longitudinally wrinkled, and often has a chequered appearance, due to small transverse and longitudinal cracks. The cork easily exfoliates, showing a brown or dark grey cortex, marked with corresponding fissures. The inner surface of the bark is dark in colour and longitudinally striated. It breaks with a short resinous fracture and has a pleasant aromatic odour, especially when burned, and an aromatic bitter taste. A transverse section of cascarilla exhibits a cork of varying thickness, the cells of which have thickened outer, but thin inner, walls; in the latter numerous minute crystals of calcium oxalate are embedded. Some of the cells of the cortex contain prismatic or cluster crystals of calcium oxalate, others droplets of oleoresin. The bast contains small scattered groups of sclerenchymatous fibres, secretion cells, and calcium oxalate in prisms or rosettes. The bark contains no sclerenchymatous cells, a character which is often useful in distinguishing it from other similar barks. Powdered cascarilla is readily identified by the characteristic cork-cells with their embedded crystals of calcium oxalate, by the bast fibres, and by the cells with oily secretion.

The bark contains about 1 per cent. of volatile oil, a bitter principle named cascarillin, and a crystalline base, cascarilline. It yields about 8 per cent. of ash.

Cascarilla is an aromatic bitter, and also possesses weak febrifuge properties. The drug is most frequently used in the form of infusion, which, however, does not keep well, and should be prescribed with an aromatic spirit or tincture. Tincture of cascarilla is an ingredient of bitter tonics, frequently with mineral acids, which precipitate some resin. Cascarilla, broken small, is used in fumigating compounds for its aromatic odour whilst burning.

NOTES.—Occasionally the barks of other species of *Croton* appear in commerce mixed with or substituted for the genuine drug. They are best distinguished microscopically, especially by the presence of sclerenchymatous cells, which are absent from the official bark. They also differ in taste and odour.

## CASEINUM.

### CASEIN.

Casein is the proteid matter of milk produced by the addition of dilute acid or rennet to skim milk, the proteid clot being collected, washed, and dried.

It occurs as a white or yellowish powder, non-hygroscopic, odourless, tasteless, insoluble in water, alcohol, or ether, but soluble in alkalis. When shaken with water and filtered, the filtrate should be neutral to litmus (absence of acid), and leave no residue on evaporation (absence of albumin and milk sugar). It should leave not more than 1 per cent. of ash on ignition, and should be free from fat and from any rancid odour.

Casein is used principally as a food stuff, but it is also employed as a basis of non-greasy skin-creams, these being usually prepared with an alkaline carbonate and mucilage of tragacanth or quince, and containing zinc oxide or other suitable medicament. A casein ointment is also made with liquid paraffin, and a pigment (Pigmentum Caseini) containing casein, 14, potassium carbonate,  $\frac{1}{2}$ , glycerin, 7, soft paraffin, 21, zinc iodide,  $\frac{1}{2}$ , carbolic acid,  $\frac{1}{2}$ , distilled water to 100.

NOTES.—A form of casein yielding 5 to 6 per cent. of ash, and containing other impurities, is used commercially for various purposes. Casein, sometimes partially digested or rendered soluble by alkali, is the chief constituent of various nutritive preparations.

## CASSIÆ CORTEX.

### CASSIA BARK.

*Synonym.*—Chinese Cinnamon.

Cassia bark is obtained from *Cinnamomum Cassia*, Blume (N.O. Laurineæ), an evergreen tree indigenous to Cochin China, but growing also in other parts of Eastern Asia. The bark is collected from cultivated trees about six years old. The branches are cut off and freed from small twigs and leaves; longitudinal and transverse incisions are then made, and the bark stripped off in pieces about 40 centimetres long and half the circumference of the branch. The pieces are planed on the convex side, to remove most of the cork and part of the cortex, then tied up into bundles and packed in cases for exportation,

The bark occurs in single quills or channelled pieces from 5 to 40 centimetres long, 12 to 18 millimetres in diameter, and 1 to 3 millimetres in thickness. The bark is of a dark, earthy-brown colour, with lighter patches of thin greyish cork. The fracture is short and granular. The odour resembles that of cinnamon, but is less delicate, the taste more mucilaginous and astringent. The bark differs from cinnamon in occurring in larger, thicker, darker pieces, and in single, seldom double quills.

The chief constituent of cassia bark is 1 to 2 per cent. of volatile oil. It also contains tannin, sugar, mucilage, and colouring matter.

Cassia bark has properties similar to those of cinnamon; it is mildly astringent, carminative, and antiseptic. Oil of cassia is used as a substitute for oil of cinnamon, which it closely resembles.

## CASSIÆ FLORES.

### CASSIA BUDS.

Cassia buds are the immature fruits of one or more species of *Cinnamomum* (N.O. Laurineæ), possibly *C. Cassia*. Blume, and *C. Loureirii*, Nees. The trees are natives of Cochin China, and are grown in South China, the so-called buds having been shipped from Canton.

The buds are club-shaped and somewhat resemble cloves in appearance. They are hard, brown or greyish, woody, and wrinkled. Each consists of a stalk supporting a cup-shaped calyx tube, the margin of which bears the remains of six calyx teeth and is curved inwards enclosing a flattened ovary. Cassia buds are about 6 to 10 millimetres in length and about 5 millimetres in diameter at their widest point. The drug has an odour and taste resembling that of cinnamon.

The chief constituent of the fruits is about 1.6 per cent. of volatile oil, consisting principally of cinnamic aldehyde.

Cassia buds are employed as a spice and for the same purposes as cinnamon.

## CASSIÆ PULPA.

### CASSIA PULP.

Cassia pulp is obtained from the fruit of *Cassia Fistula*, Linn. (N.O. Leguminosæ), a tree indigenous to India. The ovary, originally one-celled, develops into a many-celled, indehiscent pod, which, when ripe, is from 35 to 50 centimetres long, and from 18 to 25 millimetres in diameter, nearly straight and cylindrical in shape, and dark chocolate-brown in colour.

The surface of cassia pods is smooth to the naked eye, and both dorsal and ventral sutures are evident, but not prominent. The transverse spurious dissepiments, developed during the ripening of the fruit, divide the pod into as many compartments, each of which contains a single seed attached to the ventral suture by a long dark



thread-like funiculus. Adhering to each dissepiment is a thin layer of nearly black viscid pulp, which has a faint sickly odour and sweetish taste. The pulp is obtained from the fruits by crushing them, digesting with hot water, straining and evaporating to a soft extract. About 30 per cent. of pulp may thus be obtained.

The pulp contains more than half its weight of sugar, but it is not known to what constituent its laxative action is due.

Cassia pulp is a simple laxative and is an ingredient in *Confectio Sennæ*; it is rarely used alone.

*Dose*.—4 to 8 grammes (60 to 120 grains) as a laxative; 28 to 56 grammes (1 to 2 ounces) as a purgative.

*NOTES*.—The pods of *C. grandis*, Linn., and of *C. moschata*, H. B. and K., are official in the French Codex. The former are longer, thicker, and heavier than the fruits of *C. Fistula*, and have a rough surface. They are laterally compressed, and have one prominent ridge on the dorsal and two on the ventral suture. *C. moschata* bears smaller and narrower pods, and the pulp, which is paler in colour, exhales a musky odour when warmed.

## CASTOREUM.

### CASTOR.

Castor consists of the dried preputial (or vaginal) follicles of the beaver, *Castor Fiber*, Linn. (Order Rodentia), an animal found chiefly in the Hudson's Bay Territory, but also in Western Russia and Siberia. The glands are obtained from both the male and female animals, and dried.

The drug occurs in dark brown or greyish pear-shaped masses, about 5 to 7.5 centimetres long, often in pairs, connected by a dried strip of the preputial (or vaginal) canal. They are firm, heavy, and solid, have a characteristic odour, and are divided internally into numerous cells, which contain a resinous secretion, in which, when examined microscopically, spherical grains of calcium carbonate can be observed; this secretion is yellowish and creamy in the fresh sac, but becomes darker and resinous on keeping, hence the appearance of the contents of the sacs may vary considerably in colour and consistence. Occasionally the contents of the sacs are sophisticated by fraudulent addition of dried blood, resin, etc.

The composition of the drug varies considerably, the chief constituent being 40 to 70 per cent. of resinous matter soluble in alcohol; salicin, benzoic acid, and a crystalline substance termed castorin are also said to be present. The characteristic odour is due to the presence of a volatile oil.

Castor has long had a reputation in the treatment of dysmenorrhœa and hysterical conditions. It has an important action on the circulation, increasing the output from the heart and raising blood pressure, so that of late years it has come to be used in certain conditions of "flabby" heart which are not benefited by digitalis and its allies. It is used principally as *Tinctura Castorei*, which may be given in mixture form with a little mucilage to suspend the

resin, and tincture or infusion of valerian. On account of its nauseous taste, the tincture is sometimes prepared in capsule form, a portion of the spirit being removed by evaporation.

### CATAPLASMA AMYLI.

#### STARCH POULTICE.

Starch	...	...	...	...	...	10'00
Water, sufficient to produce	...	...	...	...	...	100'00

Make the starch into a paste with cold water, then add, with constant stirring, the remainder of the water, heated to boiling-point. When sufficiently cool, spread the resulting thick paste upon a strip of calico cloth, and place a piece of fine, soft muslin upon the face of it, previous to its application to the desired part.

Starch poultice is used as a substitute for the domestic "bread poultice" for application to small superficial ulcerations.

### CATAPLASMA AMYLI ET ACIDI BORICI.

#### STARCH AND BORIC ACID POULTICE.

Starch, in powder	...	...	...	...	10'00
Boric Acid	...	...	...	...	6'00
Water, sufficient to produce	...	...	...	...	100'00

Mix the starch and boric acid, and proceed as directed under Cataplasma Amyli.

This poultice is an antiseptic poultice for application to ulcerated wounds.

### CATAPLASMA CARBONIS.

#### CHARCOAL POULTICE.

Wood Charcoal, in powder	...	...	...	...	3'50
Crumb of Bread	...	...	...	...	14'00
Crushed Linseed	...	...	...	...	10'50
Boiling Water, sufficient to produce	...	...	...	...	100'00

Add the bread to the water, and macerate for ten minutes near the fire; then mix, and add the linseed meal gradually, stirring the ingredients until a soft poultice is formed. Add half the charcoal, mix, and sprinkle the remainder of the charcoal on the surface of the poultice.

It was formerly used for its deodorising and disinfectant action, this being specially exerted by the dry charcoal spread on the surface of the poultice.

### CATAPLASMA CONII.

#### HEMLOCK POULTICE.

Juice of Conium	...	...	...	...	7'00
Crushed Linseed	...	...	...	...	28'00
Boiling Water, sufficient to produce	...	...	...	...	100'00

Reduce the hemlock juice to half its volume by evaporation, add

it to the crushed linseed and water, previously mixed, and finally stir all together.

Hemlock poultice was formerly used to allay pain in ulcerous or cancerous conditions.

### CATAPLASMA FERMENTI.

#### YEAST POULTICE.

Beer Yeast	...	...	...	...	23'00
Wheaten Flour	...	...	...	...	54'00
Water, at 40°, sufficient to produce	...	...	...	...	100'00

Add the yeast to the water, stir in the flour, and place the mixture near a fire till the mass rises.

Yeast poultice was formerly applied to sloughing sores, but it may cause much pain.

### CATAPLASMA KAOLINI.

#### KAOLIN POULTICE.

*Synonym.*—Cataplasma Salicylicum Compositum.

Kaolin, in very fine powder	...	...	...	52'70
Boric Acid, in very fine powder	...	...	...	4'50
Thymol	...	...	...	0'05
Methyl Salicylate, by weight	...	...	...	0'20
Oil of Peppermint, by weight	...	...	...	0'05
Glycerin, by weight	...	...	...	42'50

Heat the kaolin in a suitable vessel to 100°, and maintain at that temperature, with occasional stirring, for one hour; then add the boric acid, mix intimately, incorporate the glycerin, and finally add the thymol, previously dissolved in the methyl salicylate and oil of peppermint. The mixture should be kept warm for four hours and stirred occasionally, before being enclosed in air-tight vessels.

Kaolin poultice is used as a cleanly and antiseptic substitute for Cataplasma Lini. The poultice is made hot and applied to the part with a spatula, in a thin layer, and covered with cotton wool or lint.

NOTES.—The above formula differs slightly from that for Cataplasma Kaolini, U.S.P., the quantity of glycerin being increased by 5 per cent. Preparations similar to the above, though differing somewhat in composition, are sold under different trade-names.

### CATAPLASMA LINI.

#### LINSEED POULTICE.

Crushed Linseed	...	...	...	28'00
Water, boiling, sufficient to produce	...	...	...	100'00

Add the linseed gradually to the water, stirring constantly. The poultice may be sprinkled with boric acid previous to application.

Linseed poultice is used to apply warmth and moisture for the relief of superficial or deep-seated inflammations. The poultice



mass is usually enclosed in muslin; the surface of the poultice may be smeared with oil to keep it from adhering to the skin.

### CATAPLASMA SINAPIS.

#### MUSTARD POULTICE.

Crushed Linseed	...	...	...	...	28·00
Mustard, in powder	...	...	...	...	2·00
Water, sufficient to produce	...	...	...	...	100·00

Add the linseed gradually to about 70 of boiling water; then add the mustard, previously rubbed to a smooth paste with a little cold or tepid water.

Mustard poultice is employed as a counter-irritant in deep-seated inflammations, such as pleurisy and bronchitis. The mustard paste may be spread on the surface of the linseed poultice if stronger action be desired.

NOTE.—Cataplasma Sinapis, B.P. 1885, was prepared by mixing powdered mustard,  $2\frac{1}{2}$ , with lukewarm water, 2 to 3, and adding linseed meal,  $2\frac{1}{2}$ , previously mixed with boiling water, 6 to 8.

### CATAPLASMA SODÆ CHLORINATÆ.

#### CHLORINE POULTICE.

Solution of Chlorinated Soda	...	...	...	14·00
Crushed Linseed	...	...	...	28·00
Boiling Water, sufficient to produce	...	...	...	100·00

Add the linseed gradually to the water, and add the solution of chlorinated soda, stirring constantly.

Chlorine poultice was formerly used as a disinfectant poultice for sloughing ulcers.

### CATECHU.

#### CATECHU.

*Synonyms.*—Pale Catechu; Gambier; Gambir; Terra Japonica.

Catechu is an extract prepared from the leaves and young shoots of *Uncaria Gambier*, Roxb. (N.O. Rubiaceæ), a climbing shrub indigenous to the Malay Archipelago, and cultivated in many of the surrounding islands. The leaves and twigs are boiled with water, the resulting decoction evaporated to a syrupy consistence in copper pans and cooled, crystallisation being induced by agitation. The mass is then drained and cut into small cubes, less frequently into strips or buttons, and dried. Much is imported in large blocks, but these are not official.

The cubes measure about 25 millimetres each way, are very light, fairly regular in shape, dark red-brown externally, pale cinnamon-brown internally, porous, and friable. They have no odour, the taste is at first bitter and astringent, then sweetish. Catechu should

not leave more than 5 per cent. of ash on incineration, and not more than 30 per cent. of the drug should be insoluble in boiling alcohol; usually the proportion insoluble in alcohol is considerably less. If 3 grammes of catechu be mixed with 25 mils of normal solution of potassium hydroxide, and shaken a few times in a separator with 50 mils of petroleum spirit, the separated spirit should exhibit a marked green fluorescence (distinction from black catechu).

Catechu consists chiefly of catechin (7 to 38 per cent.), and catechu-tannic acid (33 to 50 per cent.). In addition to these, wax, oil, and a fluorescent body, named gambier-fluorescein, occur in small quantities; the drug also contains moisture (about 10 per cent.), vegetable debris, and mineral matter (about 3 to 4 per cent.). Catechin, which is not identical with the acacatechin of cutch, occurs in white, silky needles with the formula  $C_{15}H_{14}O_6, 4H_2O$  (melting at  $175^\circ$  to  $177^\circ$ ), or anhydrous,  $C_{15}H_{14}O_6$  (melting at  $235^\circ$  to  $237.4^\circ$ ). It is sparingly soluble in cold water (1 in 1100 to 1200), but freely in boiling water and alcohol, and produces with ferric salts a deep green colour. Catechu-tannic acid is a reddish amorphous astringent substance, which precipitates gelatin, and is coloured dirty green by ferric salts. On boiling the aqueous solution with or without a mineral acid it is converted into a reddish-brown amorphous substance.

Catechu is a powerful astringent. It is used internally as *Pulvis Catechu Compositus* in association with other astringents, and as *Tinctura Catechu* in diarrhoea and hæmorrhage from the alimentary canal. The compound powder may be given in a cachet or in mixture form with sedatives; the tincture is generally used in conjunction with aromatic confection or compound chalk mixture, opium, ginger, or coto. Tincture of catechu is occasionally an ingredient of astringent injections (1 in 50), with zinc or alum salts, for gonorrhœa and gleet. Catechu lozenges are prepared for their astringent action in the mouth and throat: gargles may contain the tincture (1 in 25). Preparations of catechu are incompatible with gelatin, iron salts, and alkalies.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

*NOTES.*—Catechu or gambier is liable to be adulterated with starch, with inorganic matter, and possibly with other extracts. Starch is best detected by exhausting the drug with cold water and examining the residue microscopically. Inorganic matter is detected by increase in the percentage of ash.

## CATECHU NIGRUM.

BLACK CATECHU.

*Synonym.*—Cutch.

Black catechu is an extract prepared from the heartwood of *Acacia Catechu*, Willd. (N.O. Leguminosæ), a tree indigenous to India and Burmah. The bark and sapwood are stripped from the trunk, the red heartwood cut into chips and boiled in water in earthen pots.

The decoction is strained and boiled down in iron pots to a syrupy consistence. This is allowed to cool and is then poured into a wooden mould lined with leaves or paper and left to harden. The resulting solid extract forms large masses, which are broken up into pieces of irregular shape and exported.

Black catechu or cutch occurs in irregular dark brown or nearly black masses, to which pieces of leaves or paper are often found adhering. They are brittle, the fractured surface exhibiting numerous small cavities. They yield a reddish-brown powder, with an astringent taste.

The chief constituents of black catechu are catechu-tannic acid (25 to 35 per cent.), acacatechin (2 to 10 per cent.), quercetin, and catechu red; gum and colouring matter are also present in the drug. Black catechu differs from gambier in being devoid of a fluorescent body.

Black catechu is official in India and the Eastern and North American Colonies for use in making official preparations, for which pale catechu (gambier) is directed to be used.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

## CAULOPHYLLUM.

### CAULOPHYLLUM.

*Synonyms.*—Blue Cohosh; Pappoose Root; Squaw Root.

Caulophyllum consists of the rhizome and roots of *Caulophyllum thalictroides* (Linn.), Michaux (N.O. Berberideæ), a herbaceous plant growing in the United States.

The rhizome is horizontal, irregular, about 100 millimetres long and 6 to 12 millimetres thick, somewhat tortuous and branched. It is of a greyish-brown colour and bears on its upper surface cup-shaped depressions and short knotty branches. The under surface bears numerous wiry matted rootlets, about 10 centimetres long and 6 to 10 millimetres thick. Internally it is whitish and exhibits numerous narrow woody wedges, surrounding a large pith. The medullary rays are broad, and the parenchyma contains numerous starch grains. The drug is almost inodorous, the taste slightly sweet but somewhat acrid.

The chief constituents of blue cohosh are said to be a saponin-like, crystalline glucoside, leontin, and a colourless, odourless, and almost tasteless alkaloid, caulophylline, which crystallises with difficulty. It must not be confused with caulophyllin, a brown resinoid powder obtained by precipitating the resinous matter from a concentrated alcoholic tincture of the drug.

Caulophyllum is used as a diuretic and emmenagogue. It has also been used with success as an anthelmintic. A liquid extract is prepared and may be used in mixture form with viburnum or the tinctures of aletris and pulsatilla (see *Liquor Caulophylli et Pulsatillæ*

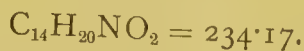


Compositus). Caulophyllin is best given in pill form. It may be combined with ergot or hydrastis.

*Dose*.—6 to 25 centigrams (1 to 4 grains).

## CEPHAELINA.

### CEPHAELINE.



Cephaeline,  $\text{C}_{14}\text{H}_{20}\text{NO}_2$ , is an alkaloid obtained from ipecacuanha root.

It occurs in the form of white silky needles, becoming yellow on exposure to light. Soluble in alcohol, chloroform, benzene, and caustic alkaline solutions; very sparingly soluble in petroleum spirit; slightly soluble in ether (more so than emetine), more soluble in the hot liquid. In a closed vessel a concentrated ethereal solution deposits after some time bunches of delicate silky crystals. The melting-point of these crystals is  $96^\circ$  to  $98^\circ$ , while the base precipitated by ammonia melts at  $102^\circ$ . By exposure on a watch-glass, at  $100^\circ$ , it loses 4.78 per cent. of its weight; at  $120^\circ$  there is no further loss, but the substance acquires a brown colour without melting, and apparently undergoes some alteration. The salts of cephaeline appear to be uncrystallisable.

Cephaeline is an emetic more powerful (and more toxic) than emetine, though the latter is the better expectorant. The action of cephaeline is slow and is obtained only by oral administration; it is not absorbed into the system. It should be triturated with sugar of milk, and prepared in the form of a pill with glycerin of tragacanth or administered as a powder.

*Dose*.—5 to 10 milligrams ( $\frac{1}{12}$  to  $\frac{1}{8}$  grain).

## CERA ALBA.

### WHITE BEESWAX.

*Synonym*.—White Wax.

White beeswax is the wax separated from the honeycomb of the hive bee, *Apis mellifica*, Linn. (Order Hymenoptera), bleached by exposing it in thin layers to the action of the air, sunlight and moisture. The process may also be effected by the aid of chemicals, such as potassium bichromate and sulphuric acid, but wax so prepared is excluded by the official description, although much of the white wax of commerce has been so prepared.

It occurs in hard, nearly white, translucent masses, and may be tested in the same manner as yellow beeswax. Specific gravity, 0.958 to 0.970 (about 0.950 to 0.960 at  $25^\circ$ ). Melting-point,  $61^\circ$  to  $64^\circ$ .

White beeswax is used in the preparation of emollient ointments, and occasionally to raise the melting-point of suppositories. The ointments so prepared, such as Unguentum Aquæ Rosæ and Unguentum Cetacei, are liable to become rancid.

**CERA ASEPTICA.****ASEPTIC WAX.**

White Beeswax	...	...	...	...	87·00
Almond Oil	...	...	...	...	12·00
Salicylic Acid	...	...	...	...	1·00

Melt the beeswax in the oil and strain through muslin, add the salicylic acid, and heat to  $150^{\circ}$  on an oil-bath. Keep in sterilised bottles, covered with an aqueous solution (1 in 500) of mercuric chloride.

Aseptic wax is used to arrest hæmorrhage from cranial bones by smearing it over the bleeding surface, and for similar surgical purposes.

**CERA FLAVA.****YELLOW BEESWAX.**

*Synonyms.*—Yellow Wax; Beeswax.

Yellow beeswax is a secretion formed by the hive bee, *Apis mellifica*, Linn. (Order Hymenoptera), and used by the insect to form the walls of the cells of the honeycomb. After the extraction of the honey the wax is melted with water, separated, and strained.

When obtained as described, beeswax is a yellowish or brownish-yellow solid, firm, and not unctuous to the touch, breaking with a dull, granular fracture, and having an agreeable honey-like odour. Specific gravity, 0·958 to 0·970 (about 0·951 to 0·960 at  $25^{\circ}$ ). Melting-point,  $61^{\circ}$  to  $64^{\circ}$ . The official ranges of specific gravity (0·960 to 0·970) and melting-point ( $62\cdot5^{\circ}$  to  $63\cdot9^{\circ}$ ) are regarded as being rather too narrow. Beeswax should be readily and entirely soluble in hot oil of turpentine. It is officially stated that it should not yield more than 3 per cent. to cold alcohol, nor more than 50 per cent. to cold ether (specific gravity, 0·735), and nothing to water, but the first two statements require confirmation. The acid number should not exceed 17·9, the saponification number should vary between 90 and 96, and the ester number between 69 and 76.

Beeswax contains about 80 per cent. of myricin or melissyl palmitate,  $C_{15}H_{31}COOC_{50}H_{61}$ , about 15 per cent. of cerotic acid,  $C_{26}H_{53}COOH$ , and an aromatic body, cerolein. The chief adulterants of beeswax are paraffin, stearic acid, tallow, carnauba wax, and possibly also starch, soap, and resin. Paraffin lowers the specific gravity and the saponification number of the wax; it may also be detected by heating with strong sulphuric acid, which chars the wax completely and leaves the paraffin unaltered, so that the latter may be dissolved out of the charred mass by ether. Stearic acid, tallow, and saponifiable fats and resins may be detected by boiling the wax with a 10 per cent. solution of caustic soda, filtering and acidifying with hydrochloric acid, when no precipitate should be produced. Colophony would also be soluble in cold alcohol, to which wax should yield not more than 3 per cent. Soap may be detected by the turbidity produced on acidifying the cooled and filtered decoction, and starch by the iodine test.

Yellow beeswax is used in pharmacy in the preparation of plasters, and of ointments in which its yellow colour is unobjectionable. The latter become rancid much less rapidly than when prepared with white beeswax. An emulsion prepared by mixing melted beeswax with an equal weight of powdered acacia in a warm mortar, and then adding water, is used as a demulcent for coughs.

*Dose.*—3 to 20 decigrams (5 to 30 grains).

NOTE.—Japan wax, obtained from the berries of various species of *Rhus* (N.O. Anacardiaceæ), is a pale yellow solid, which can be kneaded between the fingers. Specific gravity, 0·975 to 0·993. It consists chiefly of palmitin and free palmitic acid. Carnauba wax, an exudation from the leaves of *Copernicia cerifera*, Mart. (N.O. Palmæ), occurs in commerce as a whitish solid. Specific gravity, 0·990 to 0·999. It consists chiefly of myricyl cerotate, with small quantities of free cerotic acid and myricyl alcohol.

### CERATUM CALAMINÆ.

#### CALAMINE CERATE.

Prepared Calamine	...	...	...	...	20·00
Yellow Beeswax	...	...	...	...	20·00
Olive Oil	...	...	...	...	60·00

Melt the beeswax in the oil and strain through muslin; then add the calamine gradually and stir till cold.

Calamine cerate is used as a mild astringent in eczema and other cutaneous disorders.

NOTE.—This preparation corresponds to the Ceratum Calaminæ of the London Pharmacopœia, and resembles Turner's Cerate.

### CERATUM GALENI.

#### GALEN'S CERATE.

*Synonyms.*—Cold Cream; Parogen Cold Cream.

Soft Paraffin, white	...	...	...	...	12·00
White Beeswax	...	...	...	...	12·00
Almond Oil	...	...	...	...	50·00
Borax	...	...	...	...	1·00
Oil of Rose	...	...	...	...	0·10
Rose Water	...	...	...	...	25·00

Melt the wax in the oil and dissolve the borax in the rose water by the aid of gentle heat. When both solutions are at about the same temperature, add the aqueous liquid gradually to the wax and oil, and stir till the mixture stiffens. Pour into a slightly warmed mortar containing the soft paraffin, stirring until mixed. Add sufficient oil of rose to perfume, and stir till cold.

NOTES.—The above formula is especially suitable for toilet use. If a similar preparation be required as a basis for medicaments the borax should be omitted, or preference should be given to the modification of Unguentum Aquæ Rosæ.



**CERATUM PARAFFINI.**

## PARAFFIN CERATE.

Beeswax ...	...	...	...	...	...	6'00
Soft Paraffin	...	...	...	...	...	94'00

Melt together and stir constantly as the mixture cools.

Paraffin cerate can be incorporated with half its weight of water.

NOTES.—This cerate may be prepared with the yellow or white varieties of beeswax and soft paraffin; if required as the basis of a white ointment, the white beeswax and paraffin should be employed.

**CERATUM PLUMBI.**

## LEAD CERATE.

*Synonym.*—Pearson's Cerate.

Lead Plaster ...	...	...	...	...	...	50'00
Yellow Beeswax	...	...	...	...	...	12'50
Almond Oil	...	...	...	...	...	37'50

Melt the beeswax in the oil, strain through muslin, add the lead plaster, heat the mixture until the plaster is melted, and stir till cold.

Lead cerate is a soothing and mildly astringent application in eczema and other irritable conditions of the skin.

**CERATUM PLUMBI COMPOSITUM.**

## COMPOUND LEAD CERATE.

Camphor ...	...	...	...	...	...	0'5
Yellow Beeswax	...	...	...	...	...	23'5
Olive Oil	...	...	...	...	...	58'5
Solution of Lead Subacetate	...	...	...	...	...	17'5

Melt the beeswax in the oil, strain through muslin, then add the camphor and, finally, the solution of lead subacetate, stirring till cold.

Compound lead cerate is useful for application to chilblains and other inflamed surfaces.

**CEREOLI.**

## BOUGIES.

Bougies are medicated suppositories, specially adapted for the application of medicinal substances to the nose or urethra. Their preparation differs in no essential particulars from that of ordinary suppositories, but they differ in shape, being like a pointed rod or pencil. Nasal bougies, or Buginaria, as they are sometimes called, are usually made of gelatin, and are  $3\frac{3}{16}$  inches in length. Urethral bougies may be either of gelatin or cacao-butter basis, and of any length up to 6 inches. Usually they are employed  $2\frac{1}{2}$  inches or 5 inches long, and these weigh respectively 1 gramme and  $2\frac{1}{2}$  grammes, and have about the diameter of a No. 8 and No. 9 catheter.

**CEREOLI ACIDI TANNICI ET OPII.****TANNIC ACID AND OPIUM BOUGIES.**

Tannic Acid	...	...	...	...	...	6.00
Opium	...	...	...	...	...	6.00
Oil of Theobroma, sufficient to produce	...	...	...	...	...	100.00

Melt the oil of theobroma, add the tannic acid and opium, pour the mixture into a suitable mould, and divide into bougies, each weighing about 1 gramme (15 grains), and containing 6 centigrams (1 grain) each of tannic acid and opium.

NOTES.—The oil of theobroma may be replaced, if desired, by one of the following mixtures:—(1) Oil of theobroma, 90; wool fat, 10. Melt together, and stir till cold. (2) Oil of theobroma, 50; hydrous wool fat, 25; white beeswax, 25. Melt together and stir till cold.

**CEREOLI ATROPINÆ.****ATROPINE BOUGIES.**

Atropine or Atropine Sulphate	...	...	...	0.10
Oil of Theobroma, sufficient to produce	...	...	...	100.00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 1 milligram ( $\frac{1}{60}$  grain) of atropine.

**CEREOLI BELLADONNÆ.****BELLADONNA BOUGIES.**

Alcoholic Extract of Belladonna	...	...	...	12.00
Oil of Theobroma, sufficient to produce	...	...	...	100.00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 12 centigrams (2 grains) of alcoholic extract of belladonna.

**CEREOLI BISMUTHI ET PLUMBI.****BISMUTH AND LEAD BOUGIES.**

Bismuth Oxynitrate	...	...	...	...	60.00
Lead Acetate	...	...	...	...	3.00
Oil of Theobroma, sufficient to produce	...	...	...	...	100.00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 6 decigrams (10 grains) of bismuth oxynitrate, and 3 centigrams ( $\frac{1}{2}$  grain) of lead acetate.

**CEREOLI COCAINÆ.****COCAINE BOUGIES.**

Cocaine Hydrochloride	...	...	...	...	3.00
Oil of Theobroma, sufficient to produce	...	...	...	...	100.00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 3 centigrams ( $\frac{1}{2}$  grain) of cocaine hydrochloride.

**CEREOLI IODOFORMI.****IODOFORM BOUGIES.**

Iodoform	...	...	...	...	30'00
Oil of Theobroma, sufficient to produce	...	...	...	...	100'00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 3 decigrams (5 grains) of iodoform.

**CEREOLI IODOFORMI ET BELLADONNÆ.****IODOFORM AND BELLADONNA BOUGIES.**

Iodoform	...	...	...	...	30'00
Alcoholic Extract of Belladonna	...	...	...	...	3'00
Oil of Theobroma, sufficient to produce	...	...	...	...	100'00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 3 decigrams (5 grains) of iodoform and 3 centigrams ( $\frac{1}{2}$  grain) of alcoholic extract of belladonna.

**CEREOLI IODOFORMI ET MORPHINÆ.****IODOFORM AND MORPHINE BOUGIES.**

Iodoform	...	...	...	...	30'00
Morphine Hydrochloride	...	...	...	...	1'50
Oil of Theobroma, sufficient to produce	...	...	...	...	100'00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 3 decigrams (5 grains) of iodoform, and 15 milligrams ( $\frac{1}{4}$  grain) of morphine hydrochloride.

**CEREOLI IODOFORMI ET EUCALYPTI.****IODOFORM AND EUCALYPTUS BOUGIES.**

Iodoform...	...	...	...	...	10'00
Oil of Eucalyptus	...	...	...	...	20'00
Oil of Theobroma, sufficient to produce	...	...	...	...	100'00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should weigh  $2\frac{1}{2}$  grammes (40 grains), and contain 3 decigrams (5 grains) of iodoform, with 6 decimils (10 minims) of oil of eucalyptus.

**CEREOLI ZINCI SULPHATIS.****ZINC SULPHATE BOUGIES.**

Zinc Sulphate, dried	...	...	...	...	6'00
Oil of Theobroma, sufficient to produce	...	...	...	...	100'00

Proceed as in the case of Cereoli Acidi Tannici et Opii. Each bougie should contain 6 centigrams (1 grain) of dried zinc sulphate.



**CEREVISIÆ FERMENTUM.**

BEER YEAST.

*Synonym.*—Faex Medicinalis.

Beer yeast is the ferment obtained in brewing beer, and produced by *Saccharomyces* (*Torula*, Turpin) *cerevisiæ*, Meyen (Order, *Gymnoasceæ*). Compressed yeasts are distillers' yeasts and are obtained as products in the manufacture of spirits from malt and raw grain. The skimmings from the fermentation vats are first mixed with water and then passed through a series of sieves. They are then washed by decantation two or three times and again sifted, this time through finer sieves, a process requiring care in order to avoid removal of cell contents. Finally, when the yeast has completely settled it is placed in filter-presses either alone or after admixture with starch. The best yeasts, however, are absolutely pure—*i.e.*, free from starch. After compression the yeast is separated from the press cloths and made up into convenient form for distribution. Much of this yeast is imported into this country from Germany.

Yeast occurs as a viscid, frothy liquid, having a peculiar odour and bitter taste. Under the microscope it shows numerous isolated roundish or oval cells, or short-branched filaments composed of united cells. The cells are transparent, with one or two vacuoles, and often contain a somewhat granular protoplasm. German, or compressed yeast, occurs as a pasty mass of putty-like consistence, and occasionally of a crumbly nature. It has an odour and taste like those of beer yeast, and can be dried by exposing it to a temperature of 30°. Dried yeast yields to alcohol 3 per cent. of extractive, consisting largely of unsaturated fatty acids, which may be fractionally separated by conversion into their calcium or lead salts.

An active unorganised ferment, named zymase, has been separated from yeast by crushing the cells by hydraulic pressure; it decomposes saccharine solutions with production of alcohol and carbon dioxide. Yeast also contains emulsin and nuclein or nucleol, a combination of nucleic acid with albuminates and carbohydrates.

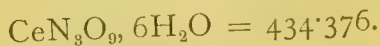
The idea that the therapeutic action of yeast is due to its property of inciting fermentation has been proved to be fallacious, for it is still active after the yeast has been heated to 130° for an hour. Its action is virtually that of nuclein; if injected it increases the proportion of leucocytes, after a transient leucopænia, and it appears to raise the opsonin content of the blood in respect to the staphylococcus and the organism of tubercle. It is given internally to check the growth of boils, and has been added to poultices for application to unhealthy wounds. When fresh yeast is given by the mouth it grows actively in the stomach, and, besides being of value in some cases of furunculosis, it slightly diminishes the quantity of sugar passed by the urine in diabetes. It has also been given in phthisis, diabetes, and septic endocarditis, on the supposition that it has bactericidal or phagocytic properties. But living yeast cells do not live in the blood, as has been asserted,

being disintegrated and absorbed, even when injected; the action of yeast is entirely due to its nucleo-albumin. Dried yeast has been given in doses of 5 decigrams (8 grains) for constipation; it occurs as a light grey powder, and is administered in keratinised capsules or tablets, to prevent solution in the stomach. Yeast soaps and combinations of yeast with ammonium ichthosulphonate, salicylic acid, etc., are used in acne, dermatitis, etc. Yeast has also been used in the treatment of acute and chronic vaginitis, endocervicitis, etc. Thus, in vaginitis, a mixture of yeast and sugar solution is sometimes smeared over the vaginal walls, a douche being administered twelve hours later, and the treatment repeated every other day if necessary. Zymin is a variety of dried yeast, produced by dehydrating yeast by means of acetone. Similar preparations are sold under the trade-names Levurine, Levurette, and Furonciline. The fatty acids of yeast extracted by alcohol are sold under the names Ceridin, Cerolin, etc., for use as mild laxatives, in doses of 1 to 2 decigrams ( $1\frac{1}{2}$  to 3 grains). Yeast extracts, which closely resemble meat extract in colour, taste, and smell, are sold pure (Marmite), or mixed with meat extract; they have not the stimulating properties of meat extract, and may be distinguished chemically by their freedom from creatinine.

*Dose of liquid yeast.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

## CERII NITRAS.

CERIUM NITRATE.



*Synonym.*—Cerous Nitrate.

Cerium nitrate,  $\text{Ce}(\text{NO}_3)_3, 6\text{H}_2\text{O}$ , may be prepared by the interaction of cerium sulphate and barium nitrate; or by dissolving freshly prepared cerium hydroxide in nitric acid, filtering the solution, and evaporating.

The nitrate usually employed for medicinal purposes is not pure. It contains the nitrates of lanthanum, didymium, and other cerite earths, has a pinkish tint, and yields a brown residue of the mixed oxides on ignition. Pure cerium nitrate is used in the manufacture of incandescent gas mantles, and occurs in white, granular, crystalline masses, with a sweet, astringent taste. It is very soluble in water and alcohol, and yields a nearly white residue of cerous oxide on ignition (39.60 per cent.). It gives off three molecules of water at  $150^\circ$ , and decomposes at  $200^\circ$ .

Salts of cerium have properties allied to those of bismuth. They are given in dyspepsia, pyrosis, and vomiting, especially the vomiting of pregnancy. Like the bismuth salts they are not absorbed. Cerium nitrate may be given in solution in mixture form, or it may be prescribed as Cerii Nitrates Effervescens.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**CERII NITRAS EFFERVESCENS.**

EFFERVESCENT CERIUM NITRATE.

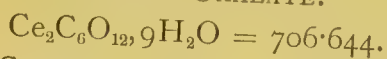
Cerium Nitrate ... ..	3'00
Sodium Bicarbonate, in powder ... ..	46'00
Tartaric Acid, in powder ... ..	24'00
Citric Acid, in powder ... ..	18'00
Refined Sugar, in powder ... ..	19'00

Mix and granulate the ingredients as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—2 to 4 grammes (30 to 60 grains).

**CERII OXALAS.**

CERIUM OXALATE.

*Synonym.*—Cerous Oxalate.

Cerium oxalate,  $\text{Ce}_2(\text{C}_2\text{O}_4)_3, 9\text{H}_2\text{O}$ , is obtained as a by-product in the separation of thorium from monazite. As found in commerce, it consists chiefly of cerium, lanthanum, and didymium oxalates, with smaller quantities of other rare earths. Cerium oxalate,  $\text{Ce}_2(\text{C}_2\text{O}_4)_3, 9\text{H}_2\text{O}$ , is usually present to the extent of about 50 per cent.

It occurs as a nearly white granular powder, odourless, tasteless, insoluble in water and other ordinary solvents, but soluble in diluted sulphuric and hydrochloric acids. On ignition it should leave about 47 per cent. of a reddish-brown residue. It should be free from arsenium, iron, aluminium, zinc, calcium, lead, carbonates, and phosphates.

Cerium oxalate is used chiefly in chronic vomiting, especially the vomiting of pregnancy. A dose of 6 decigrams may be given three times a day for several successive days if necessary. It acts in precisely the same way as the bismuth salts. It may be dispensed in powders or cachets, or in granular effervescing form.

*Dose.*—1 to 6 decigrams (2 to 10 grains).

**CERII OXALAS EFFERVESCENS.**

EFFERVESCENT CERIUM OXALATE.

Cerium Oxalate ... ..	6'00
Sodium Bicarbonate, in powder ... ..	46'00
Tartaric Acid, in powder ... ..	24'00
Citric Acid, in powder ... ..	18'00
Refined Sugar, in powder ... ..	16'00

Mix and granulate the ingredients as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—2 to 4 grammes (30 to 60 grains).



**CETACEUM.****SPERMACETI.**

Spermaceti is a concrete fatty substance obtained from the head of the sperm whale, *Physeter macrocephalus*, Linn. (Order Cetacea), which inhabits the Pacific, Atlantic, and Indian Oceans. The sperm oil, found in a large cavity in the animal's head, deposits on standing a crystalline substance, which is separated by filtration, pressed, melted, purified from traces of oil with diluted sodium hydroxide solution, and finally freed from the soap thus produced, and from excess of alkali.

Spermaceti occurs in translucent, crystalline, pearly-white masses, unctuous to the touch, with little odour or taste. It may be powdered by the aid of a little alcohol, or almond or olive oil. Specific gravity, 0.94 to 0.95 (about 0.938 to 0.944 at 25°, and 0.842 at 100°). Melting-point, from 46° to 50°. It is insoluble in water and cold alcohol, but soluble in ether, chloroform, carbon bisulphide, fixed and volatile oils, and boiling alcohol, being practically entirely deposited from the latter solvent on cooling. It is readily inflammable, and burns with a bright, somewhat sooty flame. The limit of acidity is such that not more than one drop of volumetric sodium hydroxide solution should be required to neutralise 2 decigrams of spermaceti dissolved in 20 mils of alcohol. One gramme should require for saponification between 125 and 135 milligrams of potassium hydroxide.

The chief constituent of spermaceti is cetyl palmitate (cetin); the drug also contains small quantities of esters of other fat acids.

Spermaceti is a constant component of domestic cerates and cold creams, as represented by Unguentum Cetacei and Unguentum Aquæ Rosæ. An emulsion of spermaceti is occasionally prepared for internal use as a demulcent against coughs; it is made by reducing the spermaceti to fine powder with a few drops of alcohol and emulsifying with yolk of egg or acacia.

*Dose.*— $\frac{1}{2}$  to 2 grammes (8 to 30 grains).

*NOTES.*—The crystalline appearance of spermaceti, its solubility in boiling alcohol, and its very low acidity are good indicators of its purity. Adulteration with stearic or other fatty acid may be detected by rise in the acid number or by adding water to the filtrate from the cooled solution in alcohol, when a precipitate will be obtained if stearic or palmitic acid be present, or by boiling 1 gramme with 1 gramme of anhydrous sodium carbonate and 50 mils of alcohol, filtering and acidifying the filtrate with acetic acid, when a precipitate should not be thrown down. Paraffin would be insoluble in boiling alcohol.

**CETRARIA.****ICELAND MOSS.**

Iceland moss consists of the dried lichen, *Cetraria islandica*, Acharius (N.O. Discomycetes). The plant is indigenous to Britain, and widely distributed over the Northern Hemisphere.

The drug consists of the dried cartilaginous foliose thallus, the branches of which have fringed lobes. It is brownish or

greenish-brown above, greyish below, and marked with small white depressed spots. The apothecia, which are sometimes present, appear as slightly depressed circular, reddish-brown spots on the upper surface of the thallus. The lichen is hard when dry, but becomes softer when moist. It has no odour, but a mucilaginous bitter taste. A 5 per cent. decoction gelatinises on cooling. The drug should be free from pine leaves, moss and other lichens, which are frequently present in the drug.

The chief constituent of Iceland moss is the carbohydrate lichenin, which is accompanied by its isomer isolichenin. Lichenin is soluble in hot water, but the solution gelatinises as it cools; isolichenin resembles a soluble modification of starch. Both lichenin and isolichenin are converted into sugar by boiling with a dilute mineral acid. The drug also contains a crystalline bitter principle, named cetraric acid, and lichenostearic acid. The bitterness of the lichen can be removed by prolonged maceration with water, or by macerating the powdered drug in a dilute solution of an alkali carbonate.

In the northern countries of Europe Iceland moss is used as a food, either made into bread or boiled with milk, the bitterness being to some extent removed by previous washing with water. The decoction made with milk forms a nutritious and demulcent drink. Iceland moss is used in medicine chiefly as decoction (1 in 20), for its demulcent properties, and in the form of jujube, the bitter cetraric acid being removed. Jellies are also prepared with sugar and water. The bitter principle has been given in pills as a tonic, in doses of 1 to 2 decigrams (2 to 4 grains).

## CEVADILLA.

### SABADILLA.

Sabadilla consists of the dried ripe seeds of *Schænocaulon officinale*, A. Gray (N.O. Liliaceæ), a tall herbaceous plant growing on the low mountain slopes in Mexico, Guatemala, and Venezuela. The seeds are usually imported freed from the thin brown papery pericarp.

The seeds are of a glossy, dark brown, almost black colour, about 6 millimetres or more in length, but not more than 2 millimetres wide. They are acutely pointed at one extremity, but more obtuse at the other, where both hilum and micropyle are situated, although they cannot be easily discerned. On one side of the seed there is usually a depression with sharp edges due to the mutual pressure of the seeds upon one another in the fruit, which is also slightly curved. The seeds are inodorous, but have an unpleasant, bitter acrid taste; the powder is a powerful sternutatory.

The seeds contain several alkaloids, of which cevadine (crystalline veratrine) is the most important. Cevadine,  $C_{32}H_{49}NO_9$ , occurs in colourless crystals melting at  $205^{\circ}$ , which have a very powerful

sternutatory effect; it is easily hydrolysed by alkalies yielding cevadine (cevine) and angelic acid. Cevadine is accompanied in cevadilla seeds by the alkaloids veratridine, sabadilline (cevadilline), sabadine, sabadinine, and sabatrine, the latter being said to be a mixture. Cevadilla seeds also contain cevadic and veratric acids, fatty oil, resin, etc. Veratridine is amorphous and yields by hydrolysis veratric acid and veratroine; like cevadine it has a powerful sternutatory effect.

Cevadilla is of importance chiefly as the source of the mixture of alkaloids, which is official under the name of veratrine. Cevadilla seeds in powder have been used as a parasiticide.

NOTES.—Much confusion has existed in the nomenclature of the alkaloids of cevadilla. The crystalline alkaloid cevadine has been termed veratrine; the amorphous alkaloid veratridine has also been termed veratrine, while the British Pharmacopœia applies the name veratrine to an indefinite mixture of cevadine and veratridine. Hence it is advisable to discard the name veratrine for any particular alkaloid.

### CHARTA NITRATA.

#### NITRATED PAPER.

*Synonym.*—Saltpetre Paper.

Nitrated paper is prepared by saturating white blotting-paper with a 20 per cent. aqueous solution of potassium nitrate, and drying.

Small pieces of the paper are burned, and the fumes inhaled for asthma, or the paper may be rolled up and burned in a candle-stick. Ozone papers are similar in composition. Asthma papers are also made containing extract of stramonium, chlorate of potash, lobelia, or aromatic gums. Thin paper soaked in a tincture similarly composed and dried is rolled into tubes, and smoked for the relief of asthma.

### CHARTA SINAPIS.

#### MUSTARD PAPER.

Black Mustard Seeds	...	...	...	...	50·00
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White Mustard Seeds	...	...	...	...	50·00
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Benzol, a sufficient quantity.

Solution of Indiarubber, a sufficient quantity.

Remove the fixed oil from the bruised seeds by percolation with benzol, dry the residue by exposure to warm air, and reduce it to No. 60 powder. Mix 5 grammes (75 grains) of this powder with 18 mls (5 fluid drachms) of solution of indiarubber, spread the mixture with a suitable brush over about 2 square decimetres (30 square inches) of one side of a piece of cartridge paper, and dry by exposure to air.

Mustard paper is used as a counter-irritant in lumbago, congestion of the lung, pneumonia, bronchitis, phthisis, and wherever counter-irritation is indicated. Small pieces of suitable size and shape may be applied to the temple or behind the ear, and fixed in position by a strip of adhesive plaster. "Half-strength" mustard papers are



prepared, or one or two layers of damped muslin may be placed next the skin, if the full-strength papers cause too much pain and irritation.

NOTE.—Mustard paper should be dipped in tepid water for about fifteen seconds before being applied.

## CHENOPODIUM.

### CHENOPODIUM.

*Synonym.*—American Wormseed.

Chenopodium is the fruit of *Chenopodium ambrosioides*, Linn. (N.O. Chenopodiaceæ), and of *C. ambrosioides*, var. *anthelminticum*, Gray; a perennial plant abundant in the Southern United States and Central America. The fruit should be collected in the autumn.

The drug consists of the small irregular globular fruits, not larger than the head of a pin. They are very light, and of a greenish-yellow or brown colour. On rubbing the fruit the membranous pericarp is removed, and the single, small, lenticular, brownish-black seed is exposed. The odour of the fruits is strong, resembling that of eucalyptus, the taste pungent and bitter. The fruit of *C. ambrosioides* var. *anthelminticum* is similar, but is more aromatic.

The chief constituent of the drug is the volatile oil, of which it is said to contain 3·5 per cent. This has a penetrating camphoraceous odour and pungent bitter taste. Its specific gravity is about 0·975 and rotation not over  $-5^{\circ}$  in a 100 millimetre tube at  $25^{\circ}$ . The fresh plant contains an alkaloid, chenopodine.

Chenopodium is a vermifuge used to expel lumbricoid worms. The powdered seeds are an active form of the drug. A fluid extract is prepared, of which the dose is 2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm). The volatile oil is occasionally administered in doses of 1 to 6 decimils (2 to 10 minims). These preparations follow the general rule of administration for anthelmintics. They are taken at bedtime, fasting, and are followed by an aperient.

*Dose.*—1 to 4 grammes (15 to 60 grains).

## CHIRATA.

### CHIRETTA.

*Synonym.*—Chirayta.

Chiretta consists of the dried plant, *Swertia Chirata*, Ham. (N.O. Gentianeæ), an erect annual herb, indigenous to the mountainous districts of Northern India. When the flowering is well advanced the entire plant is collected, dried, and packed into bundles, which are sometimes compressed before exportation.

The drug consists chiefly of the stem, which is of a dark purplish-brown colour, quite glabrous, and contains a large continuous pith. In the upper part it branches freely, bearing numerous fruits and flowers together with a few opposite leaves with prominent curving lateral veins. The fruits are bicarpellary but unilocular and contain numerous minute brownish seeds. The root is short, stout, and oblique. All parts of the drug have an intensely bitter taste.

The plant contains two bitter principles, viz., ophelic acid and chiratin. The latter occurs in the larger proportion, and yields, by boiling with hydrochloric acid, chiratogenin and ophelic acid, but no sugar. Neither ophelic acid nor chiratin has been obtained in crystals.

Chiretta is a bitter stomachic and tonic, useful in dyspepsia to improve the appetite. The preparations of chiretta are without astringency, and may, therefore, be prescribed with iron. Chiretta and kreat (*Andrographis*) are active ingredients of many advertised bitters. Chiratin has been marketed in powder form, diluted with milk sugar, but the liquid preparations of chiretta are usually preferred.

*Dose*.— $\frac{1}{2}$  to 2 grammes (5 to 30 grains).

*Notes*.—Various other species of *Swertia* (e.g., *S. angustifolia*, Buch.-Ham.; *S. alata*, Royle; *S. trichotoma*, Wall.) have been found mixed with or substituted for chiretta. From these the genuine drug may be distinguished by its dark colour, intensely bitter taste, and continuous pith. *Andrographis paniculata*, Nees, which has been offered as chiretta, has dark green stems with numerous slender erect opposite branches, few lanceolate green leaves, and a fibrous root. The roots of *Rubia cordifolia*, Linn., are also occasionally mixed with chiretta; they are readily distinguished by their purple colour.

### CHLORAL CAMPHORATUM.

#### CAMPHORATED CHLORAL.

Camphor ...	...	...	...	...	...	50·00
Chloral Hydrate ...	...	...	...	...	...	50·00

Rub together in a warm mortar until completely liquefied, and filter through cotton wool if necessary. Specific gravity, 1·223.

Camphorated chloral is soluble in alcohol, oils, and fats, but not in glycerin. It remains liquid at ordinary temperatures, and is used as an application to the skin for the relief of neuralgia, rheumatism, and the irritation of chilblains.

### CHLORAL CAMPHORATUM CUM COCAINA.

#### CAMPHORATED CHLORAL WITH COCAINE.

Chloral Hydrate ...	...	...	...	...	...	45·00
Camphor ...	...	...	...	...	...	45·00
Cocaine ...	...	...	...	...	...	10·00

Rub the chloral hydrate and camphor together in a warm mortar until completely liquefied, then add the cocaine and filter if necessary.

This preparation relieves toothache when applied on cotton wool. Camphorated chloral also dissolves the pure alkaloids atropine, morphine, and veratrine.

### CHLORAL CARBOLATUM.

#### CARBOLATED CHLORAL.

*Synonym*.—Chloral and Phenol.

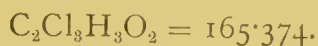
Chloral Hydrate ...	...	...	...	...	...	50·00
Carbolic Acid ...	...	...	...	...	...	50·00

Rub together in a warm mortar until completely liquefied, and filter if necessary.

Carbolated chloral is soluble in water, alcohol, and glycerin. It is useful for application on cotton wool to carious teeth.

### CHLORAL HYDRAS.

#### CHLORAL HYDRATE.



*Synonym.*—Chloralum Hydratum.

Chloral hydrate, or trichlor-ethylidene-glycol,  $\text{CCl}_3\text{CH}(\text{OH})_2$ , is prepared by adding water to the anhydrous chloral formed by the action of chlorine on ethyl alcohol, allowing to crystallise and further purifying if necessary by recrystallisation from benzin or chloroform. The product should contain at least 98.5 per cent. of pure chloral hydrate.

It occurs in colourless transparent crystals, with a pungent odour that should be free from acidity. Very soluble in water (4 in 1), alcohol (5 in 1), and ether, soluble in chloroform and fixed oils. When heated it melts, and the liquid on cooling begins to solidify at a temperature of  $48.9^\circ$ . (This is stated to be too stringent, the U.S.P. allows  $35^\circ$  to  $50^\circ$ .) Boiling-point,  $94.4^\circ$  to  $96.7^\circ$ . It should volatilise without residue. It should give no colour to sulphuric acid when shaken with it in chloroformic solution. It should be free from chloral alcoholate and from free chlorides. The official quantitative test is unsatisfactory, as the excess of alkali acts upon the chloroform produced, and thus the results are too high. If the mixture be not heated, and the titration with acid be done rapidly, fair results may be obtained, but it is better to decompose the compound completely by heating it under pressure, and then determine the chloride formed. Another method is to boil about 3 decigrams of chloral hydrate with 1 gramme of aluminium powder, 15 mls of acetic acid, and 40 mls of water, under a reflux condenser for half an hour; then filter, wash the filter and flask with water, precipitate the chloride as  $\text{AgCl}$ , dry, and weigh.

Chloral hydrate is used chiefly to produce sleep. Its use is not generally followed by headache or depression, and the sleep that it causes is not too deep to prevent the patient from being readily awakened. It is of especial value as a hypnotic in puerperal mania, insanity, and delirium tremens. It diminishes reflex excitability and relieves the spasms of chorea and tetanus. Its action as an anodyne and analgesic is inferior to that of opium. It is a useful remedy in sea-sickness, but large doses are required, and chloral formamide is therefore preferred. Chloral is used as an antidote to strychnine. The principal objection to the use of chloral is its depressant action on the heart, of the same nature as that of chloroform.

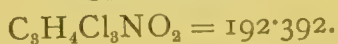


It is excreted in the urine mostly in combination with glycuronic acid as urochloralic acid. This body renders the urine very acid, and metabolic changes may arise in those poisoned with chloral, owing to this acidity in the tissues. Chloral hydrate, pure or in concentrated solution, blisters the skin; as a vesicant it may be applied spread over adhesive plaster. For its anodyne properties it is applied to the skin mixed with camphor (see Chloral Camphoratum). Tablets of chloral hydrate are made containing 30 centigrams (5 grains) in each, but are not a good form of administration. They must be dissolved before use; if sucked they will blister the tongue, and if swallowed whole they may damage the stomach-wall. Chloral hydrate should not be, but is occasionally, prescribed in pills. Syrup of chloral contains 6 decigrams (10 grains) in 4 mils (1 fluid drachm). Liquor Bromo-chloral Compositus contains chloral, potassium bromide, and Indian hemp. Chloral hydrate is occasionally used in hair washes for its antiseptic properties, in the proportion of 12 centigrams to 30 mils (2 grains to 1 fluid ounce). Chloral tannin (a mixture in molecular weights of chloral hydrate and tannin) is prepared for a similar purpose. Chloral hydrate is incompatible with alkalies and alkali carbonates. In chloral poisoning the stomach must be emptied and the patient kept warm with hot blankets and hot-water bottles. Artificial respiration must be kept up if necessary, and injections of strychnine and caffeine will be found useful to combat the depression of the circulation and to excite the respiratory centre.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### CHLORAMIDUM.

CHLORAMIDE.



*Synonyms.*—Chloralformamidum; Chloral Formamide.

Chloramide,  $\text{CCl}_3\text{CH}(\text{OH})\text{NHCHO}$ , may be prepared by mixing 147 of anhydrous chloral and 45 of formamide at ordinary temperatures and allowing the mass to crystallise. It is then purified by recrystallising from water or 30 per cent. alcohol, avoiding heating it above  $55^\circ$ .

It occurs in colourless, lustrous, odourless crystals, with a somewhat bitter taste. Soluble in water (1 in 20), and alcohol (1 in 2). Readily soluble in ether, acetone, acetic ether, and glycerin. Melting-point,  $114^\circ$  to  $115^\circ$ , with decomposition. On warming with solution of sodium hydroxide it yields chloroform, ammonia, and sodium formate. Heated to  $60^\circ$  with water it is decomposed into chloral hydrate and formamide. The aqueous solution slightly reddens litmus paper, but an alcoholic solution should be neutral. An alcoholic solution should not be immediately rendered turbid by solution of silver nitrate (absence of decomposition products). On heating it should volatilise completely (absence of inorganic impurities), and the vapours should not be readily inflammable (absence of chloral alcoholate or ethyl carbamate).

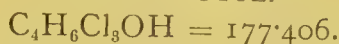
Chloramide is a hypnotic, slower in action and safer than chloral, since it has not the same depressant action on the heart. It is especially useful in the insomnia of cardiac disease. It should be finely powdered for preparing solutions. *Mistura Chloramidi Composita* represents a useful fluid form, or 1 part may be dissolved in  $2\frac{1}{2}$  parts of alcohol, and diluted with water to 30 parts, flavouring with orange or liquorice. When the proportion soluble in water is exceeded, and alcohol is undesirable, the finely powdered chloralamide may be suspended with mucilage of acacia. If prescribed in powder form with or without potassium bromide, the powder should be covered with tinfoil. Chloramide is a common constituent, with potassium bromide, of remedies for sea-sickness. It is incompatible with alkalies, and should not be given in hot liquids.

*Dose.*— $\frac{1}{2}$  to 4 grammes (5 to 60 grains).

*NOTE.*—Chloramide is also known under the trade-name Chloralamide.

## CHLORBUTOL.

CHLORBUTOL.



*Synonyms.*—Chlor-butyl Alcohol; Acetone-chloroform.

Chlorbutol probably has the constitution of trichlor-tertiary butyl alcohol,  $\text{HOC}(\text{CH}_3)_2\text{CCl}_3$ , which is obtained by heating acetone and chloroform with caustic potash.

It occurs in the form of small white crystalline flakes, and as large transparent crystals, with a characteristic musty, somewhat camphoraceous odour and a camphoraceous taste. Slightly soluble in water (1 in 125), readily soluble in alcohol, ether, chloroform, glycerin, fixed and volatile oils, benzin, and acetone. When anhydrous it melts at  $96^\circ$ , but as usually met with it contains half a molecule of water of crystallisation, and melts at  $80^\circ$  to  $81^\circ$ . Boiling-point,  $167^\circ$ . If it be shaken with water, and iodine and caustic soda be added gradually, iodoform is produced. Warmed with aniline and caustic potash solution the odour of phenyl-isocyanide is observed.

Chlorbutol is a local anæsthetic, analgesic, and antiseptic. As a hypnotic, 1 to  $1\frac{1}{2}$  or even 2 grammes may be given. Its anæsthetic properties are specially exerted upon the stomach, small repeated doses being used to allay post-operative vomiting and sea-sickness. It resembles chloral in most respects, but is without its depressant action on the heart, and has been found of value in chorea. Chlorbutol is slowly volatile at ordinary temperatures; powders should be enclosed in tinfoil, and cachets in a bottle if they are to be kept for any length of time. Tablets of chlorbutol are not readily soluble. The drug may be suspended in mixtures with acacia or tragacanth, or an elixir may be prepared containing 10 grains of chlorbutol in 1 fluid drachm each of alcohol (or tincture), and glycerin (10 grains in 120 minims, or 6 decigrams in 8 mls).

Chlorbutol is used to preserve organic solutions, but is probably not more efficient than chloroform.

*Dose.*— $\frac{1}{2}$  to  $1\frac{1}{2}$  grammes (5 to 20 grains).

NOTES.—Chlorbutol is also known under the trade-name Chloretone. It must be distinguished from chloroform prepared from acetone, which is sometimes called acetone-chloroform.

## CHLORODYNUM.

### CHLORODYNE.

Chloroform	...	...	...	...	6.00
Morphine Hydrochloride	...	...	...	...	0.50
Tincture of Indian Hemp	...	...	...	...	3.00
Tincture of Capsicum	...	...	...	...	1.50
Liquid Extract of Liquorice	...	...	...	...	12.00
Mucilage of Acacia	...	...	...	...	12.00
Treacle	...	...	...	...	25.00
Glycerin	...	...	...	...	22.00
Oil of Peppermint	...	...	...	...	0.10
Alcohol, sufficient to produce	...	...	...	...	100.00

Mix the chloroform, tincture of Indian hemp, tincture of capsicum, oil of peppermint, and glycerin with 12 of the alcohol, and dissolve the morphine hydrochloride in the mixture; then add the liquid extract of liquorice, mucilage of acacia and treacle, and sufficient alcohol to make up the required volume.

The action of chlorodyne is mainly due to the morphine it contains. The preparation is used in the treatment of diarrhœa, colic, flatulence, coughs, etc. It is a valuable sedative and antispasmodic.

*Dose.*—1 to 2 mls (15 to 30 minims).

## CHLOROFORMUM.

### CHLOROFORM.



Chloroform is trichloro-methane,  $\text{CHCl}_3$ , to which about 1 per cent. of absolute alcohol has been added. It is prepared by the action of chlorinated lime on acetone or alcohol and subsequently purified.

It occurs as a heavy, colourless liquid, with a characteristic odour, and a sweet, burning taste. Slightly soluble in water (1 in 200), miscible with alcohol, ether, and oils in all proportions. Specific gravity, 1.490 to 1.495; boiling-point,  $60^\circ$  to  $62^\circ$ . It is non-inflammable, but its heated vapour may be ignited, when it burns with a green flame. It should be free from acid, free chlorine, chlorides, and various decomposition products. It should leave no residue on evaporation and no foreign odour should be perceived when it is evaporated on filter paper.

For general anæsthesia, chloroform from pure alcohol is preferred.



The so-called A.C.E. Mixture (see Vapor Chloroformi Composita) contains alcohol, chloroform, and ether, and is a safer anæsthetic than pure chloroform when deep and prolonged anæsthesia is required. Chloroform for anæsthesia by inhalation should not exceed about 1 per cent. in the inspired air. The great danger of chloroform inhalation is caused by the sudden absorption of a large dose during the early stages of administration. This excites the medulla, and the heart ceases to beat as the result of vagal inhibition. Treatment of this condition should consist of artificial respiration, the injection of atropine with plenty of normal saline solution directly into a vein, the intravenous injection of adrenine and cardiac tonics, as well as the more usual means adopted for rousing the activity of the heart. In the third stage of chloroform narcosis, depression of the heart muscle results from the direct toxic action of the drug. This condition improves by stopping the administration for a time. Glass capsules of chloroform are prepared, containing 6 decimils (10 minims) or more in each; they are surrounded by absorbent material, and must be broken when it is necessary to inhale the vapour for asthma.

Chloroform is a solvent of resins, alkaloids, fats, fixed and volatile oils, gutta percha, and indiarubber. It is used for extracting aconite and belladonna roots (see Chloroformum Aconiti and Chloroformum Belladonnæ). As flavouring agents, stimulants and carminatives, Aqua Chloroformi, Spiritus Chloroformi, and Tinctura Chloroformi Composita are in constant use. Perles of hard gelatin for internal use contain usually 18 centimils (3 minims) of chloroform in each. Externally, chloroform is anodyne, and, if closely applied on piline, rubefacient. In Linimentum Chloroformi the camphorated oil prevents rapid evaporation of the chloroform. As a preservative, 1 minim to 1 fluid ounce keeps vegetable infusions sweet and good for a considerable time; animal elixirs and extracts are preserved by 1 per cent. of chloroform.

*Dose.*— $\frac{1}{2}$  to 3 decimils (1 to 5 minims).

*NOTES.*—Chloroform should be preserved in glass-stoppered bottles in a cool dark place. In the presence of moisture or absence of alcohol it is very liable to decomposition, but the addition of 1 per cent. of alcohol preserves it. The article known in commerce as "methylated" chloroform is made from methylated spirit, but has been almost entirely displaced by the chloroform made from acetone. After careful purification the chloroforms from rectified spirit, methylated spirit, and acetone cannot be distinguished in use, though when prepared from duty-paid rectified spirit the product costs about three times as much as that from methylated spirit or acetone.

## CHLOROFORMUM ACONITI.

### CHLOROFORM OF ACONITE.

Aconite Root, in No. 60 powder	...	...	100·00
Solution of Ammonia	...	...	25·00
Absolute Alcohol, a sufficient quantity.			
Chloroform, a sufficient quantity.			

Moisten the aconite root with the solution of ammonia and set

aside for twenty-four hours. Transfer to a percolator, and percolate with a menstruum consisting of one of absolute alcohol to seven of chloroform until 100 of percolate is obtained.

Chloroform of aconite is painted on the unbroken skin with a camel-hair brush to relieve neuralgia. It is more prompt and effective than Liniment of Aconite.

### CHLOROFORMUM ATROPINÆ.

#### CHLOROFORM OF ATROPINE.

Atropine ...	...	...	...	0.50
Alkanet Root, in coarse powder	...	...	...	0.25
Chloroform, sufficient to produce	...	...	...	100.00

Macerate the alkanet root in the chloroform for forty-eight hours; then filter, and dissolve the atropine in the coloured liquid.

This preparation is an improvement upon and has the same uses as Chloroformum Belladonnæ, which is of somewhat uncertain alkaloidal strength.

### CHLOROFORMUM BELLADONNÆ.

#### CHLOROFORM OF BELLADONNA.

Belladonna Root, in No. 60 powder	...	...	100.00
Solution of Ammonia	...	...	25.00
Absolute Alcohol, a sufficient quantity.	...	...	
Chloroform, a sufficient quantity.	...	...	

Moisten the belladonna root with the solution of ammonia and set aside for twenty-four hours. Transfer to a percolator and percolate with a menstruum consisting of one of absolute alcohol to seven of chloroform until 100 of percolate is obtained.

Chloroform of belladonna is painted on the unbroken skin with a camel-hair brush to relieve neuralgia. It is sometimes mixed with 7 parts of liniment of belladonna for application on flannel or impermeable piline in rheumatism; applied in this manner the chloroform renders the rubefacient and the anodyne action more marked; it may also be mixed with olive oil or soap liniment. A similar liniment is also made by mixing liniment of belladonna with  $\frac{1}{6}$  to  $\frac{1}{3}$  of its volume of chloroform.

### CHLOROFORMUM CAMPHORATUM.

#### CAMPHORATED CHLOROFORM.

Camphor	...	...	...	...	100.00
Chloroform	...	...	...	...	50.00

Dissolve the camphor in the chloroform.

Camphorated chloroform is a common domestic remedy for tooth-ache, applied on cotton wool to the cavity or rubbed along the gums with the finger. For the latter purpose it is sometimes mixed with tincture of capsicum or tincture of pellitory.

**CHLOROFORMUM IODI.**

## CHLOROFORM OF IODINE.

Iodine	...	...	...	...	...	10·00
Chloroform, sufficient to produce	...	...	...	...	...	100·00

Dissolve the iodine in the chloroform.

Chloroform of iodine stains less than alcoholic solutions, and is said to be less liable to promote desquamation, itching, or dermatitis.

**CHLOROPHYLLUM.**

## CHLOROPHYLL.

*Synonyms.*—Leaf Green; Chromule.

Chlorophyll is the green colouring matter which occurs in all the green parts of plants, associated with wax, starch, etc. It may be obtained by exhausting the various organs with ether, evaporating, and treating the residue with alcohol, in which the chlorophyll is easily soluble.

It occurs in commerce either in the form of an extract (Chlorophyll Spissum) or as a liquid (Chlorophyll Liquidum), both of which are of an intense, deep green colour. The former is soluble in alcohol, ether, carbon bisulphide, ethereal oils, and fixed oils; the liquid is soluble in aqueous solutions, and in alcohol of not more than 50 per cent. strength. These solutions are of a bright green colour of great intensity, and show a marked red fluorescence. The chlorophyll of commerce usually contains copper as an impurity.

Chlorophyll is said to be a resinoid and to contain iron as an essential constituent of its molecule. Its exact nature, however, has not yet been determined. It appears to vary in composition when derived from different plants. On decomposition it yields a blue and a yellow substance (the phyllocyanin and phylloxanthin of Frémy and of Schunck). It is prepared and supplied for colouring alcoholic and aqueous liquids, also oils and soaps.

**CHONDRUS.**

## CHONDRUS.

*Synonyms.*—Carrageen; Irish Moss.

Chondrus consists of the dried thallus of the seaweed, *Chondrus crispus*, Stackh. (N.O. Gigartinaceæ), which is found on the northern shores of the Atlantic Ocean, but collected for medicinal purposes chiefly on the northern shores of Brittany, where it grows just below low-water mark upon rocks and stones. When fresh it varies in colour from green to dark purplish-brown, but it is partly bleached by exposing it to the sun and watering. It is also said to be bleached artificially, by means of potassium permanganate. After bleaching it is dried, and then constitutes the so-called "Irish Moss" of commerce.

The drug occurs in yellow, translucent, horny masses, which, when separated, are seen to consist of several of the slender thalli. These



vary from 5 to 30 centimetres in length, are rounded at the base, but flattened in the upper part, and branch dichotomously, the ultimate branches having an emarginate or two-lobed apex. When softened in water the drug becomes gelatinous.

The chief constituent of Irish moss is about 64 per cent. of a carbohydrate, called carrageenin. The drug also contains about 7 per cent. of proteids, and yields from 8 to 15 per cent. of ash on incineration.

Irish moss is used as a food on the coasts of Ireland, where it abounds, and nutritious preparations, such as Irish moss jelly, are made for invalid use, but the carbohydrates are not very readily digestible. Decoction of Irish moss is a demulcent, and is occasionally given in coughs and for bladder irritation and catarrh. It is also employed as an emulsifying agent for cod-liver oil.

## CHRYSAROBINUM.

### CHRYSAROBIN.

*Synonym.*—Chrysophanic Acid.

Chrysarobin, as generally found in pharmacy, is a mixture of substances obtained from araroba by extracting with hot chloroform, evaporating to dryness, and powdering. The synonym chrysophanic acid, a name by which it is very generally known, is a misnomer, since the substance consists of chrysarobin proper ( $C_{30}H_{26}O_7$ ), dichrysarobin, and methyl-chrysarobin.

It occurs as a yellow micro-crystalline, odourless, tasteless powder, which has an irritating effect on the mucous membranes. Slightly soluble in water and in ether; entirely soluble in hot chloroform, and almost entirely in hot alcohol; partially soluble in petroleum spirit, and in solutions of alkalis with brown coloration. On heating it melts, giving off yellow vapours, and on complete ignition leaves not more than 1 per cent. of ash.

Chrysarobin is rarely used internally, since it so easily causes gastro-enteritis. A small quantity is absorbed and colours the urine yellow, which changes to red on the addition of an alkali. It is best administered in a pill made with glycerin of tragacanth. Externally *Pigmentum Chrysarobini* and *Unguentum Chrysarobini* are commonly used in psoriasis, ringworm of the scalp, and other parasitic affections of the skin. The former is a cleanly application, by which the drug is brought into close contact with the skin over a long period. The ointment, which should not be applied over a large surface and is often required to be diluted, stains the skin and linen. The stains may be removed by a solution of chlorinated lime. Plasters are prepared of various strengths. Oxidised chrysarobin has been recommended by Unna for use in ointments as a substitute for chrysarobin; it is darker in colour and is much less irritating. Derivatives of chrysarobin similarly used are anthrarobin, a reduction product of alizarin, chrysarobin triacetate (Eurobin), and chrysarobin tetra-acetate (Lenirobin).

*Dose.*— $\frac{1}{2}$  to 6 centigrams ( $\frac{1}{10}$  to 1 grain).

**CIMICIFUGÆ RHIZOMA.**

## CIMICIFUGA.

*Synonyms.*—Actææ Racemosæ Radix; Black Snakeroot.

Cimicifuga consists of the dried rhizome and roots of *Cimicifuga racemosa*, Nutt. (N.O. Ranunculaceæ), a native of Canada and the United States. The rhizome is collected in the autumn, cut into pieces, and dried.

The drug varies in length from 5 to 15 centimetres, and in diameter from 12 to 25 millimetres, and consists of a thick, hard, knotty, nearly cylindrical rhizome, bearing on its upper surface stout branches, which curve upwards, and are marked with encircling leaf scars. The roots, which are straight, short, and brittle, are often broken off near the rhizome. In transverse section the rhizome and branches show a thin, dark, horny bark, surrounding a ring of numerous paler wedges of wood separated by wide dark medullary rays, the centre being occupied by a large dark pith. The roots show four, five, or six distinct wedges of wood, separated by broad, darker medullary rays, arranged in the form of a Maltese cross. The odour of the drug is not marked, the taste is bitter and acrid. The rhizome and roots are coloured dark green by test solution of ferric chloride, the reaction distinguishing the drug from black hellebore. It should not yield more than 10 per cent. of ash on incineration.

Cimicifuga contains a crystalline body, racemosin, to which the acrid bitter taste is due, a resin and a substance allied to quercitrin. By exhausting with alcohol, concentrating the tincture and pouring it into twenty times its volume of water, about 18 per cent. of a mixture of resinous and other bodies is precipitated, to which the name of cimicifugin is given.

Cimicifuga is used as a bitter and as a mild expectorant in bronchial catarrh. It is used principally in the form of liquid extract and tincture, dispensed in mixtures. Cimicifugin is given in doses of 6 to 30 centigrams (1 to 5 grains), and is usually dispensed in pills massed with glucose.

*Dose.*— $\frac{1}{2}$  to 1 gramme (8 to 15 grains).

**CINCHONÆ RUBRÆ CORTEX.**

## RED CINCHONA BARK.

*Synonym.*—Cinchona.

Red cinchona bark is obtained from the stem and branches of cultivated plants of *Cinchona succirubra*, Pavon (N.O. Rubiaceæ), a native of South America, but cultivated in India, Jamaica, Ceylon, and elsewhere. It is exported chiefly from India.

The drug occurs in quills or more or less incurved pieces of varying size, often about 35 millimetres in diameter, the bark itself being from  $2\frac{1}{2}$  to 6 millimetres in thickness. The outer surface is dull brownish-grey or reddish-brown in colour, often grey with lichens, and more or less strongly wrinkled longitudinally, older

pieces also bearing reddish warts; small transverse cracks are sometimes seen. The characteristic red-brown inner surface shows on scraping a yellowish-brown interior, which darkens on exposure. The bark is spongy in texture, and has no perceptible odour, but a distinctly bitter and astringent taste. It should not yield more than 5 per cent. of ash on incineration.

The bark should yield between 5 and 6 per cent. of total alkaloids, of which not less than half should consist of quinine and cinchonidine. Other constituents are cinchonine, quinidine, hydrocinchonidine, quinamine, homocinchonidine, hydroquinine, quinic, and cinchotannic acids, a bitter amorphous glucoside, starch, and calcium oxalate.

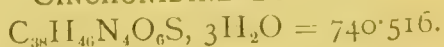
Cinchona bark is a bitter tonic and stomachic. It has the action of quinine, but is also astringent, more irritating to the stomach and intestines and slower of absorption. It is used as a "tonic" for convalescents. The liquid extract with hydrobromic acid and tincture of nux vomica is employed as a dipsomania "cure." Red cinchona bark is used in the preparation of the official cinchona preparations. The powdered bark is not much used internally, except as a domestic bitter wine, made by macerating the bark in port wine and decanting. It is a frequent and useful ingredient of astringent tooth powders. Liquid preparations of cinchona are best prescribed in an acid medium, which will keep the alkaloids in solution. Decoction of cinchona and the tinctures are, however, frequently prescribed with ammonium carbonate, which precipitates the alkaloids, so that they sometimes need suspending with mucilage of acacia. Cinchona is a useful astringent for the throat, and the decoction or acid infusion may be used as a vehicle for gargles.

*Dose.*— $\frac{1}{4}$  to 4 grammes (5 to 60 grains).

*NOTES.*—Other quilled barks appearing in commerce are those of *C. Calisaya*, *C. officinalis*, *C. lancifolia*, and *C. Ledgeriana*. *Calisaya* bark or yellow cinchona occurs in firm hard quills, the periderm of which is liable to exfoliate, and bears well-marked longitudinal and transverse cracks. It contains about 6 per cent. of alkaloids, of which about 3 per cent. is quinine. Pale cinchona or crown bark, from *C. officinalis*, is also firm, the quills being small and rough to the touch. Longitudinal cracks and numerous small transverse cracks with recurved edges mark the outer surface. It contains about 5 per cent. of alkaloids, of which  $3\frac{1}{2}$  per cent. is quinine. Colombian bark, from *C. lancifolia*, is a soft bark, with a more or less smooth surface marked with patches of silvery-grey cork. It contains about 2 per cent. of alkaloids, of which very little is quinine. Ledger bark closely resembles *calisaya*, but is marked with more numerous and less conspicuous long fissures and transverse cracks. It yields from 6 to 7 per cent. of total alkaloids, and from 3 to 5 per cent. of quinine. Cinchona, U.S.P., is the dried bark of *C. Ledgeriana*, *C. Calisaya*, or *C. officinalis*, that of *C. succirubra* being distinguished as red cinchona.

## CINCHONIDINÆ SULPHAS.

### CINCHONIDINE SULPHATE.



Cinchonidine sulphate,  $(C_{19}H_{22}N_2O)_2H_2SO_4, 3H_2O$ , is the salt of a base found in cinchona bark.



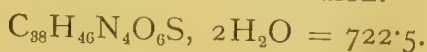
It occurs in the form of colourless, shining, silky crystals, neutral to litmus paper, without odour, but with a strong, bitter taste. It may contain either three or six molecules of water of crystallisation. Somewhat soluble in water (1 in 100), alcohol (1 in 60), almost insoluble in ether and chloroform. Melting-point (of the anhydrous salt),  $205^{\circ}$ , with darkening. The sulphate should not lose more than 8 per cent. of its weight on drying at  $100^{\circ}$ . It should only slightly tinge concentrated sulphuric acid. Not more than a slight fluorescence should be noticeable in a solution (1 in 1000) in dilute sulphuric acid (limit of quinine and quinidine). If 5 decigrams be shaken with 20 mls of water at  $15^{\circ}$  for some time, 5 decigrams of sodium potassium tartrate added, and the mixture left with frequent shaking for an hour, the filtrate should not show more than a faint opalescence on the addition of a drop of solution of ammonia (limit of cinchonine and quinidine).

Cinchonidine is the most poisonous of the alkaloids in cinchona bark; it has much the same action as quinine, but it increases reflexes, and ultimately gives rise to well-marked epileptiform convulsions. Cinchonidine sulphate is usually prescribed with diluted sulphuric acid, as in the case of quinine sulphate, to facilitate solution. Pills may be prepared with glucose or glycerin of tragacanth. An acid sulphate is obtainable, and is more freely soluble.

*Dose.*— $\frac{1}{2}$  to 6 decigrams (1 to 10 grains).

## CINCHONINÆ SULPHAS.

### CINCHONINE SULPHATE.



Cinchonine sulphate,  $(\text{C}_{19}\text{H}_{22}\text{N}_2\text{O})_2\text{H}_2\text{SO}_4, 2\text{H}_2\text{O}$ , is the salt of a base found in cinchona bark.

It occurs in white, shining crystals, without odour, but with a bitter taste, neutral to litmus paper. It contains two molecules of water of crystallisation when crystallised from water, but only one when crystallised from alcohol. Somewhat soluble in water (1 in 70), more readily in alcohol (1 in 9). Melting-point,  $198.5^{\circ}$ . It should not give more than a slight colour to sulphuric acid, and should not lose more than 5 per cent. of its weight when dried at  $100^{\circ}$ . Not more than a slight fluorescence should be noticeable in a solution (1 in 1,000) in dilute sulphuric acid (limit of quinine and quinidine). It should be slowly but completely soluble in 80 of chloroform (limit of quinine or cinchonidine sulphates).

Cinchonine is a "bitter tonic" and antiperiodic, less powerful than quinine, and less toxic; it differs in action from quinine in that it increases reflexes, and in very large doses may even cause convulsions. It is a cheap substitute for quinine, for use as a prophylactic in malaria. The solubility of cinchonine sulphate is

increased by the addition of dilute sulphuric acid. On account of its nauseous and very bitter taste it is better dispensed in pills; these may be prepared with glucose or glycerin of tragacanth.

*Dose.*— $\frac{1}{2}$  to 6 decigrams (1 to 10 grains).

### CINNAMOMI CORTEX.

CINNAMON BARK.

*Synonym.*—Ceylon Cinnamon.

Cinnamon bark is obtained from cultivated trees of *Cinnamomum zeylanicum*, Breyn. (N.O. Laurineæ), a native of Ceylon, whence the official drug is obtained. The shoots from truncated stocks are cut down when nearly two years old and from 1 to 2 metres long, the bark is stripped off, and, after exposure to the air for about twenty-four hours, freed from epidermis and cortex by scraping. The strips are then packed inside one another in long quills, and dried.

The bark occurs in long slender sticks, containing numerous small quills or channelled pieces. The quills are dull pale brown in colour, extremely thin and brittle, and often marked with little scars or holes. The inner surface is darker and marked with faint longitudinal striations. No cork is present and not more than traces of the cortex. The drug has a fragrant odour and warm sweet aromatic taste. Powdered cinnamon may be identified by the presence of numerous isolated bast fibres with thick walls and of sclerenchymatous cells with horse-shoe thickening. Small, simple starch grains and minute prisms of calcium oxalate also occur, together with the debris of oil cells. It may be distinguished from powdered cassia bark by the more slender bast fibres, smaller starch grains and absence of cork.

Cinnamon bark contains 0.5 to 1.0 per cent. of volatile oil, tannin, and mucilage. Inferior qualities are generally thicker, less carefully scraped, more mucilaginous, and less aromatic. The drug yields about 5 per cent. of ash.

Powdered cinnamon bark is carminative and antiseptic, by virtue of its volatile oil, and astringent owing to the tannin it contains. For use against diarrhœa, the powder (as in *Pulvis Cinnamomi Compositus* or *Pulvis Cretæ Aromaticus*) or the *Tinctura Cinnamomi* is preferred. *Aqua Cinnamomi* contains volatile oil in suspension and in solution, and is a useful aromatic vehicle. Oil of cinnamon is a useful antiseptic, and is said to cause a more decided leucocytosis than the other volatile oils; it is given on sugar or as *Spiritus Cinnamomi* (1 in 10). Inhalations of the oil are used in phthisis, and spray solutions, containing 1 in 20 of oil of cinnamon with liquid paraffin, are used in influenzal catarrh. The oil is used to prepare lozenges, and is also a constituent of antiseptic mouth washes.

*Dose of the powder.*—6 to 12 decigrams (10 to 20 grains).

*NOTES.*—The cinnamon tree is cultivated in other countries, notably Brazil, West Indies, and Java, but the bark obtained therefrom is inferior in fragrance to that obtained from Ceylon cinnamon. *Cinnamomum Saigonicum*, U.S.P., is the bark of an undetermined species; the dose of Saigon cinnamon is the same as that of Ceylon cinnamon.

**CISSAMPELOS.**

## CISSAMPELOS.

Cissampelos consists of the dried root of *Cissampelos Pareira*, Linn. (N.O. Menispermaceæ), a woody creeper, common in the hedges of the West Indies, and growing also in India and Ceylon.

The drug occurs in long, greyish-brown pieces, varying usually from 10 to 15 millimetres in thickness. The bark is moderately thick and marked with longitudinal, slightly spiral furrows, and sometimes with small transverse cracks. Here and there it is easily removable from the wood, disclosing separated wood-bundles. The fracture is fibrous. The transverse section exhibits ten to twenty wedge-shaped wood-bundles, in which scattered vessels are easily seen. The medullary rays are narrow and often perish, leaving the wood-bundles more or less isolated. The drug has a bitter taste, but no odour.

The chief constituent of cissampelos is the crystalline alkaloid beberine,  $C_{18}H_{21}NO_3$ , which was formerly called pelosine, and is distinct from buxine, with which it was long supposed to be identical. A small quantity of a crystalline substance, deyamettin, is also present in the drug.

Cissampelos has similar properties to pareira root, and is used in India and the Eastern Colonies as an equivalent of pareira brava, being administered in the form of Decoctum Cissampeli and Extractum Cissampeli Liquidum.

**CITRAL.**

## CITRAL.



*Synonym.*—Geranaldehyde.

Citral,  $C_{10}H_{16}O$ , is the aldehyde of geraniol, and occurs in the volatile oils of lemon grass, lemon, orange, limetta, pimento, etc. It may be separated from the oils containing it by fractional distillation, and purified; or it may be obtained by oxidising its alcohol, geraniol, by means of chromic acid mixture, thus:—Add 15 of geraniol to 10 of potassium bichromate dissolved in a mixture of 12.5 of sulphuric acid and 100 of water; keep the liquid cool at first, then allow it to become warm, and shake it well for half an hour. The mixture is next made slightly alkaline and distilled in a current of steam; the distillate is treated with a saturated solution of sodium bisulphite, and allowed to stand for twenty-four hours with occasional shaking. The crystalline body thus formed is separated, pressed between blotting-paper, washed with ether, mixed with sodium carbonate, and distilled in steam.

It occurs as a mobile, slightly yellowish, oily liquid, having a penetrating odour of lemons. Specific gravity, 0.893 to 0.897. Boiling point, 228° to 229°, with slight decomposition. Refractive index, 1.4931. It is optically inactive. By condensation with acetone in



presence of alkali it yields pseudo-ionone,  $C_{13}H_{20}O$ , a ketone which, when heated with diluted sulphuric acid, is converted into ionone, an isomer of the irone of orris root. Ionone has a powerful odour of violets and is extensively used in the preparation of artificial violet perfumes. With dehydrating agents citral yields cymene,  $C_{10}H_{14}$ , and on reduction with sodium and alcohol produces the alcohol geraniol.

The flavour of oil of lemon is chiefly due to its citral content, and the pure aldehyde may be used to increase the flavouring power of commercial samples of that oil. Citral is equivalent in this respect to about fifteen times its volume of oil of lemon.

## COCÆ FOLIA.

COCA LEAVES.

*Synonym.*—Coca.

Coca leaves are the product of *Erythroxylum Coca*, Lam. (Bolivian or Huanuco leaves), and of *E. truxillense*, Rusby (Peruvian or Truxillo leaves), shrubs (N.O. Lineæ) cultivated in Bolivia, Peru, and Ceylon, whence the leaves are imported into Europe.

Bolivian coca leaves are oval in outline and vary from 3.5 to 7 centimetres in length, and from 25 to 35 millimetres in breadth. They are brownish-green in colour and are generally well preserved. The veinlets are prominent on the upper surface, and the midrib, which projects at the apex, in the form of a minute horny apiculus, is seen under the lens to lie in a depression, and to bear a distinct raised ridge on the upper surface. On the under surface of the leaf two curved lines run from base to apex on each side of the midrib. The odour is faint but characteristic, and the taste is slightly bitter, followed by a sensation of numbness. Truxillo leaves are generally rather smaller than the Bolivian variety, more broken, and pale green in colour. The ridge above the midrib and the curved lines on each side of it are less distinct, and the veinlets much less prominent on the upper surface. They are occasionally mixed with flowers of a species of *Inga*, an intentional addition made with the object of improving the drug.

Coca leaves contain the alkaloids cocaine (methyl-benzoyl-ecgonine), cinnamylcocaine (methyl-cinnamyl-ecgonine), truxilline (isatropyl-cocaine or cocamine), and benzoyl-pseudo-tropine (tropacocaine). The total amount yielded by the commercial leaves varies from about 0.1 to 1.0 per cent. As a rule Truxillo leaves contain rather more alkaloid than Bolivian, but only about one-half of it is cocaine, whereas from three-fourths to five-sixths of the total alkaloid in Bolivian leaves consists of cocaine. The latter are to be preferred for medicinal use. Coca leaves also contain cocatannic acid, wax, and several yellow crystalline bodies (cocacitrin, cocacetin, cocaflavin, cocaflavetin) which are not alkaloids.

Coca leaves are used as a stimulant and "nervine tonic," especially during convalescence. The drug relieves gastric pain,

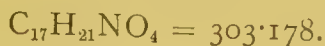
nausea and vomiting. The properties of coca are virtually those of cocaine, though preparations of the whole drug appear rather more stimulating and possess a mild astringency. In Peru and Bolivia coca leaves are chewed for their effect in appeasing hunger and fatigue. The leaves of commerce are not so active in this respect as the freshly dried drug used where it is found native. Preparations of coca—apart from the alkaloid—are *Extractum Cocæ Liquidum*, *Extractum Cocæ*, *Vinum Cocæ*, and *Elixir Cocæ*. The liquid extract contains some wax from the leaves, which is precipitated when mixed with water. The miscible liquid extract is free from this objection. *Extractum Cocæ* is dispensed in pills and pastilles. The latter are sucked for their local action and for their stimulating effect. *Vinum Cocæ* and *Elixir Cocæ* are more pleasant forms of administering the drug.

*Dose*.—2 to 8 grammes (30 to 120 grains).

NOTES.—Ceylon leaves which are imported into this country in considerable quantities are the leaves of *E. Coca*; they resemble Bolivian leaves, but are usually larger, and are said to contain rather less alkaloid. Coca leaves from Java are derived from *E. Coca*, var. *spruceanum*, Burck.; they are exported in the crushed state from Java to Germany *via* Amsterdam and yield about 0·7 per cent. of total alkaloid, part of which is benzoyl-pseudo-tropine or tropacocaine. Young (Java) leaves, carefully dried, have been found to contain as much as 2 per cent. of alkaloid. As the cocaine is easily hydrolysed it is desirable that the leaves should be free from mildew and kept in a dry place.

## COCAINA.

### COCAINE.



*Synonym*.—Methyl-benzoyl-ecgonine.

Cocaine,  $\text{C}_9\text{H}_{13}(\text{CH}_3)(\text{C}_6\text{H}_5\text{CO})\text{NO}_3$ , is an alkaloid occurring in the leaves of *Erythroxylum Coca* and its varieties. Much of the cocaine of commerce is extracted in South America and exported in the crude state to Europe, where it is purified. It may be obtained from the leaves by extracting with a 2 to 5 per cent. solution of sulphuric acid, freeing the resulting solution from colouring matter, etc., precipitating by the addition of sodium carbonate in excess, and purifying the alkaloid thus obtained by recrystallisation from ether or other suitable solvent.

It occurs in the form of shining, colourless, monoclinic prisms, odourless, and having a slightly bitter taste, which is immediately followed by a temporary tingling and numbness of the tongue. This anæsthetic action is produced on all the mucous membranes, especially when the alkaloid is applied in the form of a soluble salt. Very slightly soluble in water (about 1 in 1300), but more soluble in alcohol (1 in 10), chloroform (2 in 1), ether (1 in 4), oleic acid (1 in 4), olive oil (1 in 12), castor oil (1 in 10), liquid or soft paraffin (1 in 100), oil of turpentine (1 in 14), and benzol (1 in 3); also soluble in toluol, amyl alcohol, and petroleum spirit, but insoluble in glycerin. Hot

water decomposes it into benzoyl-ecgonine, and on boiling with hydrochloric acid, diluted sulphuric acid, or barium hydroxide it is decomposed into methyl alcohol, benzoic acid, and ecgonine. Melting-point,  $98^{\circ}$ , recrystallising on cooling; on further application of heat it volatilises with decomposition of the greater portion. On complete ignition it leaves no residue. Its solutions are strongly lævorotatory. When its solution in hydrochloric acid is evaporated to dryness, the residue should respond to the tests mentioned under *Cocainæ Hydrochloridum*. It should be free from chlorides and sulphates.

27. Cocaine is a general protoplasmic poison, destroying all forms of undifferentiated protoplasm, but having a special affinity for nervous tissue. It arrests the movements of cilia and of spermatozoa, and stops the amœboid movement of white blood corpuscles. It is a powerful local anæsthetic through its paralysing action on sensory nerve fibres. This action is exerted merely by painting a solution on mucous surfaces; to obtain cutaneous local anæsthesia, the drug must be injected hypodermically, the nerve-bundles being rendered insensible so far as the solution reaches them: 20 minims of a 2 per cent. solution produces local anæsthesia in from five to twenty minutes, which lasts for fifteen minutes. Injection is also necessary in tooth extraction to reach the nerves supplying the teeth. Adrenine is added to solutions of cocaine for injection when a local effect is desired and absorption is to be avoided. Injected into the spinal canal, cocaine cuts off sensation below the site of puncture. Applied to the eye, it blanches the conjunctiva temporarily, and produces some dilatation of the pupil, with complete local anæsthesia; a 4 per cent. solution produces complete anæsthesia in about fifteen minutes, which lasts for another fifteen minutes. The effect of cocaine upon the central nervous system is to produce general excitation; it acts more especially on the higher centres, and in doses of  $\frac{1}{2}$  to 1 grain causes a feeling of exhilaration and an increased capacity for mental work. Many alarming symptoms have followed even small injections of the drug, such as faintness, headaches, and attacks of syncope. Cocaine also excites the medulla and so raises blood-pressure from vasoconstriction, and stimulates respiration. The heart-beat is quickened. In large doses the stimulation of the brain is expressed by convulsions. The prolonged use of the drug results in a habit. Cocaine habitues suffer from emaciation, a rapid pulse, loss of memory, sleeplessness and delusions, as well as the intolerable craving for the drug. Many synthetic substitutes for cocaine have been suggested for use as local anæsthetics, including amydracaine (Alypin), amylocaine (Stovaine), benzocaine (Anæsthesin), ethocaine (Novacaine), glycocaine (Nirvanin), guanicaïne (Acoïne), orthocaine (New Orthoform), and phenacaine (Holocaine). But little is known as yet regarding these compounds; it is usually claimed that they are less toxic than cocaine, but their efficiency as local anæsthetics also appears to be less.

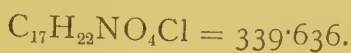


Cocaine is used chiefly in the form of its salts, such as the hydrochloride, nitrate, salicylate, and sulphate; but pure cocaine is used for combination with fatty or oily bases, as in suppositories, ointments, and oily spray solutions. Cocaine ointment relieves pruritus, the irritation of urticaria or eczema, and the pain of facial neuralgia. Spray solutions are used in hay fever, asthma, pharyngitis, and laryngitis. They may be oily solutions of the pure alkaloid or aqueous solutions of its salts. Unguentum Cocainæ contains cocaine alkaloid dissolved in oleic acid and mixed with lard. It is not suitable for ophthalmic use, for which purpose the pure alkaloid may be dissolved in soft paraffin or a mixture of almond oil and anhydrous wool fat. Liquid paraffin will retain only 1 per cent. of cocaine in permanent solution. Stronger solutions (2 to 5 per cent.) may be prepared with almond oil or a mixture of almond oil and liquid paraffin. For external application to chilblains a 2 per cent. solution of cocaine in collodion may be used. For toothache a 5 to 10 per cent. solution in oil of cloves is recommended. A very moderate heat only should be used in the preparation of oily solutions of cocaine. Solutions of pure cocaine in oils and fats are by some considered less active than aqueous solutions of cocaine salts. In cases of poisoning by cocaine, strong coffee should be given by the mouth or rectum, hypodermic injections of ether, strychnine, or digitalin administered, and amyl nitrite inhaled.

*Dose*.—3 to 30 milligrams ( $\frac{1}{20}$  to  $\frac{1}{2}$  grain).

## COCAINÆ HYDROCHLORIDUM.

COCAINE HYDROCHLORIDE.



*Synonym*.—Hydrochlorate of Cocaine.

Cocaine hydrochloride,  $\text{C}_{17}\text{H}_{21}\text{NO}_4, \text{HCl}$ , is a salt of a base found in coca leaves.

It occurs in colourless crystals, or as a white crystalline powder, and has a bitter taste, which is succeeded by numbness. Very soluble in water (2 in 1), alcohol (1 in 3), and glycerin (1 in 3); soluble in chloroform (1 in 20), insoluble in oils, and almost insoluble in ether. It should contain not more than traces of sulphates or amorphous alkaloid, nor lose more than 1 per cent. of water when dried at  $100^\circ$ . It melts at  $180^\circ$  to  $186^\circ$ , and should leave no residue on complete ignition. A solution, containing 1 decigram of the salt dissolved in 5 mils of distilled water,  $1\frac{1}{2}$  decimils of dilute sulphuric acid, and 1 decimil of solution of potassium permanganate, should not fade in half an hour (absence of cinnamyl-cocaine, cocamine, or other products derived from cocaine). 100 mils of a 0.1 per cent. solution of the salt affords with  $2\frac{1}{2}$  decimils of solution of ammonia a clear solution, from which a crystalline deposit, free from amorphous

flocks, should separate gradually on continued and vigorous stirring (limit of amorphous alkaloid.)

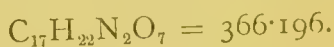
Cocaine hydrochloride is generally suitable for aqueous solutions except for combination with silver nitrate or lead acetate, when cocaine nitrate should be used. Freshly boiled and cooled distilled water must be used in the preparation of cocaine solutions, on account of their tendency to develop fungoid growths. *Injectio Cocainæ Hypodermica* contains 10 per cent. of cocaine hydrochloride, with 0·15 per cent. of salicylic acid added as a preservative. Solutions for ophthalmic use contain 2 to 4 per cent. Pastilles contain from 3 milligrams ( $\frac{1}{20}$  grain) to 12 milligrams ( $\frac{1}{5}$  grain) in each, and lozenges are prepared of the same strengths for use against throat irritation and hoarseness. *Lamellæ Cocainæ* contain  $\frac{1}{50}$  grain in each. Cocaine hydrochloride is prescribed in pill form for internal use to relieve gastric pain and to allay sea-sickness. Solutions of cocaine are applied locally to mucous surfaces previous to operation. For the production of deep-seated anæsthesia, local infiltration is resorted to, a preparation of the suprarenal gland being commonly added to the cocaine (or betacaine) solution to constrict the blood vessels and so reduce hæmorrhage (see *Adrenina*). The local anæsthesia so produced is more prolonged than with cocaine only, and there is less danger of absorption. Cocaine hydrochloride is incompatible with borax, and to obtain a clear solution the borax must be neutralised with boric acid before adding the cocaine salt in solution. Cocaine hydrochloride forms an insoluble compound with mercuric chloride and should not be prescribed therewith. It is also incompatible with alkalies and alkali carbonates, carbolic acid, and soluble silver salts. Cocaine solutions should not be sterilised by boiling.

*Dose.*—12 to 30 milligrams ( $\frac{1}{5}$  to  $\frac{1}{2}$  grain).

NOTE.—As cocaine hydrochloride tends to decompose in the presence of moisture and light, it should be kept in dry, well-stoppered bottles in a dark place.

## COCAINÆ NITRAS.

### COCAINE NITRATE.



Cocaine nitrate,  $\text{C}_{17}\text{H}_{21}\text{NO}_4\text{HNO}_3$ , is prepared by neutralising cocaine with dilute nitric acid, and crystallising.

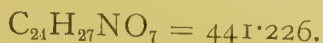
It occurs in large, colourless, tabular crystals. Readily soluble in water and alcohol, slightly soluble in ether.

Cocaine nitrate is employed for the same purposes as the hydrochloride, but can be prescribed with silver nitrate, or may be applied before the silver salt, to lessen the pain caused by the latter.

*Dose.*—3 to 30 milligrams ( $\frac{1}{20}$  to  $\frac{1}{2}$  grain).

**COCAINÆ SALICYLAS.**

COCAINE SALICYLATE.



Cocaine salicylate,  $\text{C}_{17}\text{H}_{21}\text{NO}_4$ ,  $\text{C}_7\text{H}_6\text{O}_3$ , is prepared by the interaction of cocaine and salicylic acid.

It occurs in white deliquescent crystalline masses. Soluble in water (5 in 1), and alcohol (5 in 2).

Cocaine salicylate has been recommended for hypodermic injection in spasmodic asthma, but it possesses no advantage over the hydrochloride. It is sometimes prescribed in eye lotions with sodium salicylate.

*Dose*.—3 to 30 milligrams ( $\frac{1}{20}$  to  $\frac{1}{2}$  grain).

**COCCULI FRUCTUS.**

COCCULUS INDICUS.

*Synonyms*.—Cocculus; Levant Berries.

Cocculus indicus is the fruit of *Anamirta paniculata*, Colebr. (N.O. Menispermaceæ), a climbing shrub indigenous to Eastern India and the Malay Archipelago. The fruits are collected when ripe and dried.

The fruit is brownish-black in colour, about 12 millimetres in length, and more or less reniform in shape. The pericarp is hard and rough, and bears on the concave side the scar of the stalk, and also a minute prominence, the remains of the style. The pericarp encloses a single oily, cup-shaped seed, into the hollow of which an ingrowth of the mesocarp and endocarp projects. The fruit has no odour; the seed has a bitter taste.

The chief constituent of cocculus indicus is the bitter, crystalline, poisonous substance, picrotoxin, which occurs in the seed only to the extent of 1.0 to 1.5 per cent., associated with a little cocculin (anamirtin). The seeds also contain about 50 per cent. of fat. In the pericarp of the fruit two tasteless alkaloids, menispermene and paramenispermene have been found.

Cocculus indicus is of importance as the source of picrotoxin. The powdered berries are sometimes used in the form of ointment (1 in 60) for destroying pediculi; a tincture and a fluid extract are also prepared, generally for external use. For most purposes the neutral active principle picrotoxin is preferred to the crude drug. The entire fruits have been used to stupefy fish, being thrown into the water for that purpose.

**COCCUS.**

COCHINEAL.

Cochineal consists of the dried fecundated female insect, *Coccus Cacti*, Linn. (Order Hemiptera), reared on *Nopalea cochinellifera*,



Salm-Dyck (N.O. Cactaceæ), and other species of *Nopalea*. The insects are indigenous to Central America and Mexico, but the drug is now chiefly obtained from the Canary Islands. After fecundation the insects develop an abundance of red colouring matter. They are then collected by brushing them off the plants, and killed by the fumes of burning charcoal or sulphur, or by stove heat or hot water, "silver-grain" cochineal resulting in the former case, whilst "black-grain" cochineal is obtained when heat is applied.

The dried insects are about 5 millimetres long, oval in outline, flat or slightly concave on one side, and arched on the other. They are wrinkled transversely, nearly black ("black-grain") or greyish ("silver-grain") in colour, and brittle, readily yielding a dull, purplish powder. When macerated with water no insoluble powder should separate. Incinerated with free access of air, the drug should yield not more than 6 per cent. of ash.

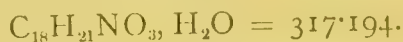
The chief constituent of cochineal is about 10 per cent. of carminic acid, obtainable in small red prismatic crystals, soluble in water, alcohol, and alkaline solutions. About 10 per cent. of fat and 2 per cent. of wax is also present, as well as albuminoids, etc. Not more than 10 per cent. of ash should be left on incineration, and no inorganic matter should be separated when the drug is shaken with water.

Cochineal is used principally as a colouring agent. A tincture of cochineal is prepared and sometimes used as an ingredient of cough mixtures, but it has no medicinal virtues. The brilliant red colouring matter of the cochineal insect is best seen as carmine and its preparations. Tincture of cochineal tends to form a cloudy mixture with water, owing to the presence of some fat, and solution of carmine gives a brighter tint. Preparations of cochineal are turned yellow by the mineral acids and become purple with alkalis. The colouring matter is often precipitated by the salts contained in hard tap-water, and distilled water only should be used for dilution.

NOTES.—Cochineal is often artificially weighted with inorganic matter. In the case of the silver-grain variety barium or lead carbonate or sulphate is used, while the black-grain variety is "faced" with black lead, ivory black, or manganese dioxide, or may contain very dark grains of magnetic sand containing iron. These adulterants are readily detected by soaking the drug in water, or by the abnormally high ash.

## CODEINA.

### CODEINE.



*Synonym.*—Methyl-morphine.

Codeine,  $\text{C}_{17}\text{H}_{18}(\text{CH}_3)\text{NO}_3, \text{H}_2\text{O}$ , is an alkaloid obtained from opium, or it may be prepared by the methylation of morphine.

It occurs in colourless or nearly colourless crystals with a bitter taste and alkaline reaction. Soluble in cold water (1 in 80),

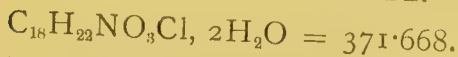
boiling water (1 in 24), alcohol (1 in 2), ether (1 in 30), chloroform (1 in 2), benzol (1 in 12), and solution of ammonia (1 in 85); freely soluble in amyl alcohol, methyl alcohol, carbon bisulphide, and diluted acids, but insoluble in petroleum benzin or in aqueous solution of potassium and sodium hydroxides. Its solutions are strongly lævo-rotatory. It should be free from morphine and other impurities that reduce ferric chloride. As a further test of purity its melting-point,  $152^{\circ}$  to  $154.9^{\circ}$ , may be taken; sulphuric acid (free from nitrous acid) produces, in the cold, not more than a transient pink colour (absence of narcotine and other opium alkaloids, which produce a violet colour).

Codeine has only a mild hypnotic action; it is especially useful in insomnia where sleeplessness is caused by incessant coughing. Codeine does not depress the respiratory centre to the same extent as morphine, but it nevertheless diminishes the appreciation of local irritation in the respiratory organs. It is, therefore, much used to allay cough, especially the cough of phthisis. Codeine decreases and sometimes entirely removes the sugar from the urine in diabetes, owing to its effect on metabolism; for this purpose it is generally preferred to morphine, as it has less effect on the bowels. Sometimes very large doses are given, up to 3 decigrams (5 grains) three times daily, unless much drowsiness is produced. Muscular twitchings and convulsions may follow large doses. Codeine exerts a marked action upon the nerve-cells on the splanchnic fibres; it allays abdominal pain without giving rise to depression, or preventing the action of the bowels. For its remote action, and where considerable doses are required, as in diabetes, codeine is prescribed generally in pills, often with nux vomica and cascara. Where its local soothing action is an advantage, linctus, syrup, pastilles (8 milligrams,  $\frac{1}{5}$  grain, in each), and jelly of codeine are available, the slightly bitter taste being to some extent disguised in these forms. For solution, however, the more soluble codeine phosphate is better than the pure alkaloid.

*Dose.*—15 to 120 milligrams ( $\frac{1}{4}$  to 2 grains).

## CODEINÆ HYDROCHLORIDUM.

### CODEINE HYDROCHLORIDE.



Codeine hydrochloride,  $\text{C}_{18}\text{H}_{21}\text{NO}_3, \text{HCl}, 2\text{H}_2\text{O}$ , is a salt of a base found in opium.

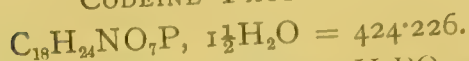
It occurs as a white crystalline powder with a bitter taste. Soluble in water (1 in 20); melting-point,  $153^{\circ}$  to  $155^{\circ}$ .

The action of codeine hydrochloride is similar to that of other salts of codeine.

*Dose.*—15 to 120 milligrams ( $\frac{1}{4}$  to 2 grains).

**CODEINÆ PHOSPHAS.**

## CODEINE PHOSPHATE.



Codeine phosphate,  $\text{C}_{17}\text{H}_{18}(\text{CH}_3)\text{NO}_3$ ,  $\text{H}_3\text{PO}_4$ ,  $1\frac{1}{2}\text{H}_2\text{O}$ , is a salt of a base found in opium. It may be prepared by dissolving 10 of codeine in 12·5 of a 25 per cent. solution of phosphoric acid, maintaining a slight acidity, and then adding sufficient alcohol to precipitate the salt.

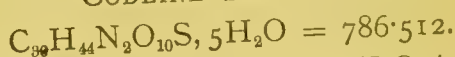
It occurs in colourless crystals, or as a white crystalline powder, odourless and having a bitter taste. Soluble in water (1 in 4), slightly soluble in alcohol (1 in 200). The aqueous solution reddens blue litmus paper. It sometimes crystallises with two molecules of water of crystallisation. On heating it loses its water at  $100^\circ$ , and melts at about  $235^\circ$  to a yellowish-brown liquid, which rapidly volatilises. It should be free from chlorides, sulphates, and morphine, and should dissolve in sulphuric acid without coloration.

Codeine phosphate, on account of its ready solubility in water, is preferred for the preparation of syrups and linctuses, and is the least irritating salt for hypodermic use. It contains 74·7 per cent. of the pure crystalline alkaloid. Hypodermic injection of codeine phosphate may contain 6 centigrams in 4 decimils (1 grain in 6 minims).

*Dose.*—15 to 120 milligrams ( $\frac{1}{4}$  to 2 grains).

**CODEINÆ SULPHAS.**

## CODEINE SULPHATE.



Codeine sulphate,  $(\text{C}_{18}\text{H}_{21}\text{NO})_2\text{H}_2\text{SO}_4$ ,  $5\text{H}_2\text{O}$ , is a salt of a base found in opium.

It occurs in white crystals, or as a crystalline powder, efflorescing in the air, and having a bitter taste. Soluble in water (1 in 40), only slightly soluble in alcohol, and insoluble in chloroform or ether.

The action of codeine sulphate is similar to that of other salts of codeine.

*Dose.*—15 to 120 milligrams ( $\frac{1}{4}$  to 2 grains).

**COLCHICI CORMUS.**

## COLCHICUM CORM.

Colchicum corm is obtained from the meadow saffron, *Colchicum autumnale*, Linn. (N.O. Liliaceæ), a plant distributed over Central and Southern Europe and common in parts of England. It should be collected in the early summer, and, for use in the dried state, stripped of its coats, sliced transversely and dried at a temperature not exceeding  $65^\circ$ .



The fresh corm is about 3 centimetres long and 25 millimetres broad, bluntly conical in shape, flattened on one side and enveloped in an outer, brown, and inner, reddish-yellow, membranous coat. The interior is white and fleshy, exuding when cut a bitter juice, milky from the presence of starch grains. The odour is disagreeable. The dried drug occurs in whitish slices, 2 or 3 millimetres thick, yellowish on their outer surface and reniform in outline. They break with a short starchy fracture, are inodorous, but have a bitter taste.

The chief constituent of colchicum corm is the yellow amorphous alkaloid, colchicine, of which it contains from 0.5 to 0.6 per cent. Starch is also present.

Colchicum is a specific in acute gout. It relieves the pain and inflammation, cutting short the attack, but does not increase the quantity of the urine or the amount of uric acid excreted (see also Colchicina). Colchicum may cause considerable gastro-intestinal irritation with vomiting and purging. Its use for long periods is not recommended, owing to its paralytic action upon the central nervous system. The dried corm in powder may be used in pills or as Vinum Colchici, containing 1 part in 5. Extractum Colchici is prepared from the fresh corms and is an active form of the drug. Colchicum is an ingredient of many advertised gout remedies. Favourite gout and rheumatic pills are composed of extract of colchicum, blue pill, colocynth, and henbane. The use of henbane or belladonna with colchicum removes the tendency to intestinal irritation, since colchicum, like jaborandi, excites the vagal nerve endings in the gut, and these same nerves are paralysed by atropine. Generally, preparations of colchicum corm are best given with a purge.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

*NOTE.*—Colchici Cormus, U.S.P., should contain not less than 0.35 per cent. of colchicine.

## COLCHICI FLORES.

### COLCHICUM FLOWERS.

Colchicum flowers consist of the fresh perianth of the meadow saffron, *Colchicum autumnale*, Linn. (N.O. Liliaceæ). The flowers appear in the autumn.

The six leaves of the perianth cohere to form a tube 7 or 8 centimetres long, which grows beyond the ovaries and above the surface of the soil, terminating in petaloid, six-partite limbs 3 or 4 centimetres long. This is characterised by its pale purple colour and bitter taste. If dried the flowers turn brown, and at the same time the bitterness decreases; they are therefore used in the fresh state.

Colchicum flowers contain, when fresh, apparently about 0.1 per cent. of colchicine, but on this point considerable discrepancy exists in the records. A tincture of the flowers is prepared, and is used for similar purposes to other preparations of colchicum.

**COLCHICI SEMINA.****COLCHICUM SEEDS.**

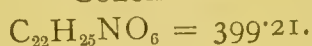
Colchicum seeds are the product of *Colchicum autumnale*, Linn. (N.O. Liliaceæ), a plant distributed over Central and Southern Europe, and common in parts of England.

The dried ripe seeds are small, very hard, rough (from the presence of minute pits), and dull dark reddish-brown in colour. They are about  $2\frac{1}{2}$  millimetres in diameter, nearly spherical in shape, and somewhat pointed from the remains of a thick funiculus. The seeds are tough to cut, and exhibit in section an oily endosperm. They have no odour, but a bitter, acrid taste.

The seeds yield about 0.7 per cent. of the amorphous, yellow, toxic alkaloid colchicine, which resides chiefly in the seed-coats.

The physiological action and therapeutic properties of colchicum are described under Colchici Cormus and Colchicina. Colchicum seeds are considered to be more powerful therapeutically, rather less drastic, and more certain in their action than the corm. They are used chiefly in the form of Tinctura Colchici Seminum.

NOTE.—Colchici Semina, U.S.P., should contain not less than 0.55 per cent. of colchicine.

**COLCHICINA.****COLCHICINE.**

Colchicine,  $\text{C}_{22}\text{H}_{25}\text{NO}_6$ , is an alkaloid found in colchicum corm, flowers, and seeds.

It occurs in the form of yellow flakes, or as a whitish-yellow amorphous powder, having a hay-like odour when damped and warmed, a very bitter taste, and darkening on exposure to light, owing to the formation of oxydicolchicine. Very soluble in water, alcohol, and chloroform, very slightly soluble in ether, almost insoluble in petroleum ether. Its aqueous solution is neutral to litmus, lævo-rotatory, and yellow. Melting-point, when dry,  $145^\circ$ . It is a feeble base and is decomposed when warmed with dilute acids or alkalies, methyl alcohol and colchicine being formed. It may be extracted from acid solution by chloroform. If a small quantity be dissolved in sulphuric acid, and a little nitric acid added, a beautiful greenish-blue colour is produced, which changes through sky-blue to red and yellow; on the addition of sodium hydroxide to the yellow solution it becomes red. Nitric acid produces with colchicine a dirty violet colour, which passes to greenish, and finally to yellow. It should leave no residue on ignition. If 1 decigram be mixed with 3 decigrams of calcium carbonate, moistened with water, dried, and ignited, the residue, when dissolved in nitric acid, should be free from chlorides (absence of a compound of colchicine and chloroform).

Colchicine has a marked action upon plain muscle, especially of the intestine, producing increased peristalsis and setting up diarrhœa

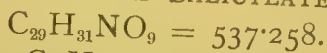
and vomiting. It is a "slow poison" to the brain; in large doses after a latent period of from one to three hours, a motor and sensory paralysis occurs, ending in death from respiratory failure. Colchicine undergoes change to oxydicolchicine in the system. It first decreases and then increases the proportion of leucocytes in the blood, and excites karyokinesis in bone marrow cells. Colchicine is employed as a specific in acute gout. Its action in gout may be due to its effect upon the white corpuscles or a corresponding stimulation of other tissues of the body. It has no effect on the heart and circulatory system. It is occasionally given in the form of solution, but solutions do not keep well, and pills are better. These may be prepared with milk sugar and glycerin of tragacanth. The alkaloid is largely used in combination with methyl salicylate (Colchisal), in capsules containing  $\frac{1}{4}$  milligram ( $\frac{1}{250}$  grain) of the base. For hypodermic injection, a solution should be freshly prepared, containing 2 milligrams in 1 mil ( $\frac{1}{32}$  grain in 15 minims). In cases of poisoning by colchicine, the following antidotes may be employed:—Stimulants, opiates, tannin, emetic of copper sulphate, 2 decigrams (3 grains), and zinc sulphate, 3 decigrams (5 grains), every fifteen minutes.

*Dose.*— $\frac{1}{2}$  to 2 milligrams ( $\frac{1}{120}$  to  $\frac{1}{30}$  grain).

*NOTE.*—Colchicine should be kept in a dark place.

### COLCHICINÆ SALICYLAS.

COLCHICINE SALICYLATE.



Colchicine salicylate,  $C_{22}H_{25}NO_6 \cdot C_7H_5O_3$ , is a salt of a base found in colchicum corm and seeds. It may be prepared by mixing 20 of colchicine with 7 of salicylic acid, moistening the mixture with water, and drying.

It occurs as a yellow amorphous powder, readily soluble in water, alcohol, and ether.

Colchicine salicylate may be made into pills with sugar of milk and glycerin of tragacanth, but is more generally dispensed in capsules containing in each  $\frac{1}{4}$  milligram ( $\frac{1}{250}$  grain) of colchicine salicylate dissolved in methyl salicylate, one or two capsules being given for a dose.

*Dose.*— $\frac{1}{2}$  to 2 milligrams ( $\frac{1}{120}$  to  $\frac{1}{30}$  grain).

*NOTE.*—Colchicine salicylate should be kept in a dark place.

### COLLINSONIA.

COLLINSONIA.

*Synonyms.*—Stone Root; Knob Root; Heal-all.

Collinsonia is the rhizome of *Collinsonia canadensis*, Linn. (N.O. Labiata), a plant indigenous to the United States and Canada.

The drug occurs in irregular, hard, brown pieces about 4 or 5 centimetres in length and 1 to 2 centimetres thick. It often bears



short knotty branches together with conspicuous cup-shaped scars of aerial stems on its upper surface, and short wiry remains of roots or depressed scars of the same on its lower surface. Internally it is whitish, the transverse section exhibiting darker lines, but no vessels. It has no marked odour or taste.

The rhizome contains resin, tannin, starch, mucilage and wax. A small quantity (1.37 per cent.) of a crystalline alkaloid possessing diuretic properties has also been isolated from it.

Collinsonia is an antispasmodic in gastric and intestinal flatulence and in biliary colic. In America it is used in stone, gravel, and cystitis for its reputed diuretic and sedative properties. A tincture and a liquid extract are prepared for internal use. The powdered root is sometimes made into suppositories, 1 gramme (15 grains) in each, for piles. An eclectic resinoid named collinsonin, which is given in doses of 12 to 25 centigrams (2 to 4 grains), is prepared by pouring a tincture of the drug into water and collecting the precipitate.

*Dose.*—1 to 4 grammes (15 to 60 grains).

## COLLODIUM.

### COLLODION.

*Synonyms.*—Contractile Collodion ; Solution of Pyroxylin.

Pyroxylin ...	...	...	...	...	...	2.00
Ether ...	...	...	...	...	...	72.00
Alcohol ...	...	...	...	...	...	24.00

Add the pyroxylin to the mixed liquids and set aside for a few days. Should there be a sediment, decant the clear solution.

Collodion is much used to seal surgical wounds, for application to cuts and abrasions, and as a vehicle for the application of drugs to the skin when prolonged local action is required. The film contracts on drying, and tends to crack. Many substitutes for collodion have been suggested, including the following:—1. The use of celloidin (a purified pyroxylin) gives a clearer solution and a firmer film. The hands may be coated with such a solution as a substitute for rubber gloves. 2. A solution of pyroxylin or celloidin in acetone may be prepared up to a 10 per cent. strength (Filmogen or Photoxylin). 3. A solution of pyroxylin, 1, in absolute alcohol, 20 by weight, with camphor, 20 (Camphoid). 4. A solution of celluloid in acetone or amyl acetate. 5. Solution of pyroxylin in methyl alcohol. The contraction of the collodion film is an advantage when pressure is required, as in applications for chilblains and for checking hæmorrhage from cut surfaces or leech-bites, but it is often a disadvantage in surgical work, when applied to large surfaces (see under Collodium Flexile).

*Notes.*—Collodion is highly inflammable; it should therefore be kept in well-closed bottles in a cool place. Methylated collodion is prepared with methylated ether (specific gravity, 0.720) and methylated spirit. Collodium, U.S.P., is prepared by dissolving 4 of pyroxylin in 75 of ether (96 per cent.) and adding 25 of alcohol (95 per cent.).

**COLLODIUM ACETONUM.**

## ACETONE COLLODION.

Pyroxylin	...	...	...	...	5'00
Oil of Cloves	...	...	...	...	2'00
Amyl Acetate	...	...	...	...	25'00
Benzol	...	...	...	...	20'00
Acetone, sufficient to produce	...	...	...	...	100'00

Dissolve the pyroxylin in 50 of the acetone, add the oil of cloves and benzol, and make up the required volume with acetone.

This preparation is an excellent liquid court plaster, and a useful application for chilblains and for small cuts and abrasions.

**COLLODIUM ANODYNUM.**

## ANODYNE COLLODION.

*Synonym.*—Anodyne Colloid.

Aconitine	...	...	...	...	0'10
Veratrine	...	...	...	...	0'60
Flexible Collodion, sufficient to produce	...	...	...	...	100'00

Dissolve the aconitine and veratrine in the collodion.

Anodyne collodion is a valuable application for neuralgia, sciatica, lumbago, and muscular rheumatism, but must not be applied to broken skin.

**COLLODIUM ATROPINÆ.**

## ATROPINE COLLODION.

Atropine Sulphate	...	...	...	...	0'50
Acetone Collodion, sufficient to produce	...	...	...	...	100'00

Dissolve the atropine sulphate in the collodion.

Collodion of atropine is a colourless substitute for collodion of belladonna, suitable for application to exposed parts. It allays the irritation of chilblains.

**COLLODIUM BELLADONNÆ.**

## BELLADONNA COLLODION.

*Synonyms.*—Emplastrum Belladonnæ Fluidum;  
Liquid Belladonna Plaster.

Liquid Extract of Belladonna	...	...	...	50'00
Canada Turpentine	...	...	...	4'00
Castor Oil	...	...	...	2'00
Camphor	...	...	...	1'50
Pyroxylin	...	...	...	2'50
Ether (specific gravity, 0'720) sufficient to produce	...	...	...	100'00

Mix the extract of belladonna, Canada turpentine, castor oil, and 40 of the ether; shake well, allow to stand for twelve hours, then

decant, filter, dissolve the camphor and pyroxylin in the mixture, and add sufficient ether to make the product measure 100.

Collodion of belladonna is used as a cleanly substitute for belladonna plasters; it is especially suitable for painting over joints, or wherever a plaster cannot conveniently be employed. It relieves the pain of rheumatic joints; applied to the breast it suppresses the secretion of milk.

### COLLODIUM CANTHARIDINI.

#### CANTHARIDIN COLLODION.

Cantharidin	...	...	...	...	...	0.35
Acetone Collodion, sufficient to produce	...	...	...	...	...	100.00

Dissolve the cantharidin in the collodion.

This preparation may be used instead of Collodium Vesicans, which is not uniform in composition.

### COLLODIUM FLEXILE.

#### FLEXIBLE COLLODION.

Collodion...	...	...	...	...	...	96.00
Canada Turpentine	...	...	...	...	...	4.00
Castor Oil	...	...	...	...	...	2.00

Mix the Canada turpentine with the collodion, then add the castor oil.

The film formed by this collodion does not contract on drying, nor does it crack, but it does not adhere so well as that formed by Collodium Acetoneum.

NOTES.—Flexible collodion, being highly inflammable, should be kept in well-closed bottles in a cool place. Collodium Flexile, U.S.P., is prepared by mixing 92 of collodion with 5 of Canada turpentine and 3 of castor oil, all by weight.

### COLLODIUM IODI.

#### IODINE COLLODION.

Iodine	...	...	...	...	...	6.50
Acetone Collodion, sufficient to produce	...	...	...	...	...	100.00

Dissolve the iodine in the collodion.

Collodion of iodine is used as an application to ringworm, chilblains, and swollen glands.

NOTE.—Collodion of iodine should not be made with collodion containing methylated spirit, or a pungent odour develops.

### COLLODIUM IODOFORMI.

#### ODOFORM COLLODION.

Iodoform	...	...	...	...	...	10.00
Flexible Collodion, sufficient to produce	...	...	...	...	...	100.00

Dissolve the iodoform in the flexible collodion.

Iodoform collodion is used as a pigment for venereal sores.



**COLLODIUM SALICYLICUM.**

## SALICYLIC COLLODION.

Salicylic Acid	...	...	...	...	12'00
Acetone Collodion, sufficient to produce	...	...	...	...	100'00

Dissolve the salicylic acid in the collodion.

Salicylic collodion is a painless application for warts, etc.

**COLLODIUM SALICYLICUM COMPOSITUM.**

## COMPOUND SALICYLIC COLLODION.

*Synonyms.*—Collodium Callosum; Corn Solvent.

Salicylic Acid	...	...	...	...	12'00
Extract of Indian Hemp	...	...	...	...	2'00
Acetone Collodion, sufficient to produce	...	...	...	...	100'00

Dissolve the acid and extract in the collodion.

This preparation is used as a corn and wart "solvent." For use on exposed parts, the colourless Collodium Salicylicum is preferable.

**COLLODIUM STYPTICUM.**

## STYPTIC COLLODION.

*Synonym.*—Styptic Colloid.

Benzoin	...	...	...	...	1'50
Pyroxylin	...	...	...	...	1'50
Tannic Acid	...	...	...	...	16'00
Alcohol	...	...	...	...	16'00
Ether, sufficient to produce	...	...	...	...	100'00

Dissolve the benzoin in the alcohol, filter, add the tannic acid, dissolve, and add the other ingredients. Set aside for three days and decant.

Styptic collodion is used to arrest bleeding from leech-bites, small wounds and abrasions.

**COLLODIUM VESICANS.**

## BLISTERING COLLODION.

*Synonym.*—Collodium Cantharidatum.

Pyroxylin	...	...	...	...	2'50
Blistering Liquid	...	...	...	...	100'00

Dissolve the pyroxylin in the blistering liquid.

Blistering collodion is used as a blistering agent or counter-irritant, especially where blistering plasters cannot readily be applied, as to the temple or behind the ear.

NOTES.—This preparation contains a less constant proportion of cantharidin, to which its action is alone due, than Collodium Cantharidini, which may therefore be prescribed instead with advantage. Collodium Cantharidatum, U.S.P., is prepared by dissolving 15 of a chloroformic extract of cantharides in 85 by weight of flexible collodion.

**COLLYRIUM ACIDI BORICI.****BORIC ACID EYE-LOTION.**

Boric Acid	...	...	...	...	2'00
Distilled Water, sufficient to produce...	...	...	...	...	100'00

Dissolve the boric acid in the recently boiled distilled water.

This lotion is used as an antiseptic and mild astringent in conjunctivitis and ophthalmia.

**COLLYRIUM ACIDI BORICI ET ZINCI****BORIC ACID AND ZINC EYE-LOTION.**

Boric Acid	...	...	...	...	1'00
Zinc Sulphate	...	...	...	...	0'10
Distilled Water, sufficient to produce ...	...	...	...	...	100'00

Dissolve the boric acid and zinc sulphate in the recently boiled distilled water.

This lotion is used as an antiseptic and astringent in ophthalmia. It soothes the irritation arising from exposure to dust or sand.

**COLLYRIUM BELLADONNÆ.****BELLADONNA EYE-LOTION.**

Green Extract of Belladonna	...	...	...	0'50
Distilled Water, sufficient to produce ...	...	...	...	100'00

Dissolve the extract in the recently boiled distilled water, and strain through cotton.

This lotion is used as a soothing application to allay irritation. It dilates the pupil slightly.

**COLOCYNTHIDIS PULPA.****COLOCYNTH PULP.**

*Synonyms.*—Colocynthis ; Colocynth ; Bitter Apple.

Colocynth pulp is obtained from the fruit of *Citrullus Colocynthis*, Schrad. (N.O. Cucurbitaceæ), a plant distributed throughout North Africa, Syria Persia, and North-West India, and cultivated in Spain and Cyprus. The fruit is collected when ripe, freed from the rind, and dried. More rarely it is imported unpeeled.

The drug occurs in commerce in balls about 5 centimetres in diameter, which are often more or less broken. Each fruit consists of a whitish, pith-like pulp, in which a large number of hard, whitish or brownish, flattened, oval seeds, arranged in six vertical rows, are contained. For use in pharmacy the pulp must be separated from the seeds by breaking the fruits open and picking or sifting. The pulp thus obtained has little odour but an intensely bitter taste; the seeds, when quite free from adhering pulp, are almost tasteless.

Colocynth pulp consists of very large, thin-walled, parenchymatous cells, with occasional fibro-vascular bundles, which are accompanied by tubular cells containing the active constituent colocynthin. It contains no sclerenchymatous cells or starch and yields to petroleum ether about 1 to 1.3 per cent. (not over 2 per cent.) of fixed oil. On incineration, from 7 to 13 per cent. of ash is obtained.

The active constituent of colocynth pulp, colocynthin, has been obtained as a pale yellow, crystalline, intensely bitter glucoside, easily hydrolysed by dilute acids and alkalies, yielding colocynthein, elaterin and glucose; the drug also contains a white crystalline body named colocynthetin.

Colocynth pulp is rarely used alone, on account of its drastic nature, but is an important ingredient in *Extractum Colocynthis Compositum*, *Pilula Colocynthis Composita*, and *Pilula Colocynthis et Hyoscyami*. It is extremely irritant, severe pain being caused if the powdered drug or colocynthin is applied to the nostrils, whilst renal disease ensues if either is given subcutaneously. Kohlstock found that colocynthin dissolved in glycerin (1 to 3 centigrams) and given as an enema caused purgation generally within the hour. A simple tincture of colocynth is prepared. It has a nauseous, bitter taste; but may be given in mixture form with the tinctures of *podophyllum* and *belladonna*.

*Dose*.—1 to 3 decigrams (2 to 5 grains).

*NOTES*.—Two varieties, Turkey colocynth and Spanish colocynth, are regularly imported. Of these the former is the finer fruit, and more esteemed, as it is whiter in colour and contains a larger proportion of pulp. The seeds, which form about 75 per cent. of the weight of the drug as imported, consist of a hard shell enclosing a small, oily nucleus; they yield from 2.5 to 3 per cent. of ash, and contain about 17 per cent. of fixed oil. The presence of seeds in powdered colocynth would increase the amount of oil yielded to petroleum spirit, which should not exceed 2 per cent. Petroleum spirit is preferable to ether, which is specified in the official test; ether removes about 3 to 3.5 per cent. from the dried pulp, but only about one-third of this is oil. More definite information concerning the presence of the seeds is afforded by microscopical examination, by which the sclerenchymatous tissue of the seed-coats may readily be detected. The presence of starch in the powdered drug would be revealed by the iodine test. Colocynth fruits, broken small, are much used for keeping away moths from furs and woollen goods.

## CONDURANGO CORTEX.

CONDURANGO BARK.

*Synonym*.—Condurango.

Condurango is the bark of *Gonolobus Cundurango*, Triana (N.O. *Asclepiadæ*), a climbing plant indigenous to Ecuador. The bark is removed from the stem by beating with a mallet, and then dried in the sun.

The bark occurs in quilled or curved pieces about 5 to 10 centimetres long, 0.5 to 2.0 centimetres wide, and 2 to 6 millimetres thick. It is covered externally with a thin greyish-brown cork, which is often warty, sometimes scaly; the inner surface is paler and coarsely



striated. It breaks with a short, somewhat fibrous fracture. The section is pale and, when examined under the lens, exhibits scattered groups of sclerenchymatous cells. Under the microscope it is characterised by the abundance of cluster crystals of calcium oxalate, numerous laticiferous vessels and groups of stone cells and bast fibres. The bark is almost odourless, but has a bitter and somewhat acrid taste.

The active constituents of condurango are but imperfectly known. It contains a toxic resin, and one or more glucosides varying in their toxicity, condurangin being the name applied to a mixture of such glucosides. Condurangin, or that constituent of it which is soluble in cold water and is the most toxic, possesses the remarkable property of coagulating like albumen when its aqueous solutions are boiled, the coagulum being redissolved on cooling. Hence decoctions of condurango should be strained when cold, otherwise the whole of the condurangin may be removed. Condurangin has been considered to be identical with vincetoxin.

Condurango is a bitter substance used in dyspepsia. It was introduced as a cure for cancer, but has no effect on the progress of that disease. A liquid extract is prepared, and condurango wine is a favourite Continental form of the drug.

*Dose.*—1 to 4 grammes (15 to 60 grains).

## CONFECTIO AROMATICA.

### AROMATIC CONFECTION.

Cinnamon Bark, in powder	...	...	...	4·00
Nutmeg, in powder	...	...	...	4·00
Saffron, in powder	...	...	...	4·00
Cloves, in powder	...	...	...	2·00
Cardamom Seeds, in powder	...	...	...	1·00
Refined Sugar, in powder	...	...	...	51·00
Prepared Chalk, in powder	...	...	...	34·00

Mix the powders thoroughly and pass the mixture through a fine sieve; then rub lightly in a mortar and place in a stoppered bottle. When required for use, add one-fourth its weight of distilled water to the powder and mix thoroughly.

Aromatic confection is used as a carminative and mild astringent in the diarrhœa of children, especially when there is acidity. Lozenges may be prepared to contain 1 or 2 grammes in each, the powder being massed with water and mucilage of acacia, and the lozenges dried.

*Dose.*—1 to 4 grammes (10 to 60 grains).

NOTES.—This preparation was official in the London Pharmacopœia, 1850; it is very similar in composition to Pulvis Cretæ Aromaticus, B.P., but the latter contains no saffron.

**CONFECTIO GUAIACI COMPOSITA.**

COMPOUND CONFECTION OF GUAIAACUM.

*Synonym.*—Chelsea Pensioner.

Guaiacum Resin, in powder	...	...	...	1'00
Rhubarb, in powder	...	...	...	2'00
Acid Potassium Tartrate, in powder	...	...	...	7'50
Nutmeg, in powder	...	...	...	1'00
Sublimed Sulphur	...	...	...	14'50
Clarified Honey	...	...	...	74'00

Mix the powders together, then add the clarified honey, and mix thoroughly.

This confection is a popular remedy for gout and rheumatism.

*Dose.*—4 to 8 grammes (60 to 120 grains).

**CONFECTIO OPII.**

CONFECTION OF OPIUM.

Compound Powder of Opium	...	...	...	25'00
Syrup	...	...	...	75'00

Add the syrup gradually to the compound powder of opium, and mix thoroughly.

Confection of opium is given in diarrhœa unaccompanied by inflammation, and in flatulent colic.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

*NOTE.*—Confectio Opii was official in the British Pharmacopœia, 1885.

**CONFECTIO PIPERIS.**

CONFECTION OF PEPPER.

*Synonym.*—Ward's Paste.

Black Pepper, in fine powder	...	...	...	10'00
Caraway Fruit, in fine powder	...	...	...	15'00
Clarified Honey	...	...	...	75'00

Mix the powders, then add the honey gradually, and mix thoroughly.

Confection of pepper is a useful carminative. It is given in combination with confection of senna for hæmorrhoids and anal ulcers; also with cubebs and copaiba for its stimulant action on the mucous membrane in gonorrhœa.

*Dose.*—4 to 8 grammes (60 to 120 grains).

**CONFECTIO ROSÆ CANINÆ.**

CONFECTION OF HIPS.

*Synonym.*—Confectio Cynosbati.

Hips, deprived of their seed-like fruits	...	...	35'00
Refined Sugar, sufficient to produce	...	...	100'00

Beat the hips to a pulp in a stone mortar, rub the pulp through a sieve; then add the sugar and mix thoroughly.

Confection of hips is used chiefly as a pill excipient.

*NOTE.*—This preparation was official in the British Pharmacopœia, 1885.

**CONFECTIO ROSÆ GALLICÆ.**

## CONFECTION OF ROSES.

Fresh Red-rose Petals ...	...	...	...	25'00
Refined Sugar ...	...	...	...	75'00

Add the rose petals to the sugar and beat well together.

Confection of roses is used chiefly as a pill excipient.

NOTE.—Confectio Rosæ, U.S.P., is prepared with 8 of powdered red-rose petals, 16 of rose water, 64 of sugar, and 12 of clarified honey.

**CONFECTIO RUTÆ.**

## CONFECTION OF RUE.

Rue, freshly powdered...	...	...	...	6'75
Bay Laurel Berries, in powder	...	...	...	6'75
Black Pepper, in powder	...	...	...	1'125
Caraway Fruit, in powder	...	...	...	6'75
Sagapenum ...	...	...	...	2'25
Clarified Honey...	...	...	...	72'00
Distilled Water, sufficient to produce, by weight	...	...	...	100'00

Mix to form an electuary.

Confection of rue is an antispasmodic and carminative; sometimes used for infantile convulsions in the form of enema.

*Dose.*—4 to 8 grammes (60 to 120 grains).

**CONFECTIO SCAMMONII.**

## CONFECTION OF SCAMMONY.

Scammony Resin, in powder ...	...	...	...	30'00
Ginger, in fine powder ...	...	...	...	15'00
Oil of Caraway ...	...	...	...	1'25
Oil of Cloves ...	...	...	...	0'625
Syrup, by weight ...	...	...	...	40'00
Clarified Honey, sufficient to produce	...	...	...	100'00

Mix the powders with the syrup and 10 of the honey, add the oils, mix, and make up with honey.

Confection of scammony is an active cathartic.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

NOTE.—Confectio Scammonii was official in the British Pharmacopœia, 1885.

**CONFECTIO SENNÆ.**

## CONFECTION OF SENNA.

*Synonym.*—Lenitive Electuary.

Senna, in fine powder ...	...	...	...	9'33
Coriander Fruit, in fine powder	...	...	...	4'00
Figs ...	...	...	...	16'00
Tamarinds ...	...	...	...	12'00
Cassia Pulp ...	...	...	...	12'00
Prunes ...	...	...	...	8'00
Extract of Liquorice ...	...	...	...	1'33
Refined Sugar ...	...	...	...	40'00
Distilled Water, sufficient to produce by weight	...	...	...	100'00



Place the figs, prunes, and 32 of the water in a covered vessel and boil gently for four hours; replace the water lost by evaporation and incorporate the tamarinds and cassia pulp; digest for two hours; then rub the pulp through a hair sieve, rejecting the seeds and hard parts. To the resulting pulp add the sugar and extract of liquorice and gently heat until dissolved; while still warm add gradually the previously mixed senna and coriander powders, and thoroughly mix together. Finally, either by evaporation or by the addition of more water, make the weight of the resulting product 100.

Confection of senna is a mild laxative, especially suitable in convalescence, for pregnant women, and for persons suffering from hæmorrhoids.

*Dose.*—4 to 8 grammes (60 to 120 grains).

*NOTE.*—*Confectio Sennæ*, U.S.P., is prepared with 10 of senna, 0.5 of oil of coriander, 12 of figs, 10 of tamarinds, 16 of cassia pods, 7 of prunes, and 55.5 of sugar.

### CONFECTIO SENNÆ ET SULPHURIS.

#### CONFECTION OF SENNA AND SULPHUR.

Confection of Senna	...	...	...	...	50.00
Confection of Sulphur	...	...	...	...	50.00

Mix the two confections thoroughly.

*Dose.*—4 to 8 grammes (60 to 120 grains).

### CONFECTIO SULPHURIS.

#### CONFECTION OF SULPHUR.

Sublimed Sulphur	...	...	...	...	40.00
Acid Potassium Tartrate, in powder	...	...	...	...	10.00
Tragacanth, in powder	...	...	...	...	0.40
Syrup	...	...	...	...	20.00
Tincture of Orange	...	...	...	...	5.00
Glycerin, sufficient to produce, by weight	...	...	...	...	100.00

Mix the powders, then add the mixed liquids gradually.

Confection of sulphur is a mild laxative in hæmorrhoids, and is a pleasant preparation for administering to children.

*Dose.*—4 to 8 grammes (60 to 120 grains).

### CONFECTIO TEREBINTHINÆ.

#### CONFECTION OF TURPENTINE.

Oil of Turpentine	...	...	...	...	25.00
Liquorice Root, in powder	...	...	...	...	25.00
Clarified Honey, sufficient to produce, by weight	...	...	...	...	100.00

Rub the oil with the liquorice, add the honey, and mix to a uniform consistence.

Confection of turpentine is diuretic and antispasmodic. Large doses are purgative and anthelmintic.

*Dose.*—4 to 8 grammes (60 to 120 grains).

*NOTE.*—*Confectio Terebinthinæ* was official in the British Pharmacopœia, 1885.

**CONII FOLIA.****CONIUM LEAVES.**

*Synonyms.*—Conium ; Hemlock Leaves.

Conium leaves are obtained from the hemlock, *Conium maculatum*, Linn. (N.O. Umbelliferae), a plant distributed throughout Europe and Great Britain. The fresh leaves and young branches are collected when the fruit is beginning to form.

The leaves are much divided and quite glabrous, the ultimate divisions terminating in smooth, colourless points. They are attached by amplexicaul petioles to a smooth hollow stem, marked with purplish spots. The inflorescence is a compound umbel, provided with both general and partial involucre, the latter consisting of three short lanceolate bracts directed outwards. The fruits bear crenate ridges, and have a deeply grooved endosperm. The drug has a disagreeable odour of mice, which is accentuated by the addition of solution of potassium hydroxide.

The chief constituents of conium leaves are the alkaloids coniine (conine) and conhydrine ; the stem contains about 0·06 per cent. of total alkaloids, the leaves about 0·18 per cent., and the flowers and flower-stalks about 0·24 per cent. Conium also contains methylconiine, ethyl-piperidine, and pseudo-conhydrine. Coniine is a highly toxic, colourless, oily liquid, with a disagreeable mouse-like odour.

Fresh conium herb is employed in the preparation of Succus Conii, and of the green extract. Succus Conii is used internally for its sedative and antispasmodic properties (see Coniina). Externally, as Unguentum Conii, it is a soothing application to hæmorrhoids and other painful or irritable conditions of the rectum and anus. For inhalation the addition of alkali to the juice is necessary to set free the alkaloid from its natural combination (see Vapor Coniinae). The green extract of conium is used in pill form and also in suppositories as a sedative. The latter may contain 30 centigrams (5 grains) in each, and require the same precaution in making as suppositories of other green extracts.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

*NOTES.*—Conium leaves are liable to adulteration with the leaves of other indigenous umbelliferous plants, such as wild chervil, *Anthriscus sylvestris*, Hoffm., and fool's parsley, *Æthusa Cynapium*, Linn. Wild chervil is distinguished by its hairy leaves, fool's parsley by the absence of a general involucre of bracts, the bracts of the partial involucre being long and narrow ; the ultimate divisions of the leaves terminate in short brownish points.

**CONII FRUCTUS.****CONIUM FRUIT.**

*Synonym.*—Hemlock Fruit.

Conium fruit is the product of the hemlock, *Conium maculatum*, Linn. (N.O. Umbelliferae), a plant distributed throughout Europe and Great Britain. The fruits are officially directed to be collected when full grown, but before they ripen, and dried.

Conium fruit should be greenish-grey in colour, about 3 millimetres in length and breadth; they are broadly ovoid in shape, slightly compressed laterally and crowned with small stylopods. The separate mericarps are quite glabrous and marked with five irregular crenate primary ridges. Cut transversely the endosperm is seen to be deeply grooved, but no vittæ are present. The fruits have no marked colour or taste, but develop a strong disagreeable mouse-like odour when triturated with solution of potassium hydroxide.

If gathered at the right time and dried, hemlock fruits yield as much as 3.36 per cent. of coniine. Commercial fruits only yield from  $\frac{1}{2}$  to 1 per cent. of coniine, due to their collection after they have attained full growth and are ripening, at which period the quantity of alkaloid rapidly diminishes. Conhydrine, methyl-coniine, ethyl-piperidine, and pseudo-conhydrine are also present.

Conium fruit is the chief source of coniine, of which it contains a greater proportion than the leaves. Preparations of conium fruit are Tinctura Conii and Extractum Conii Liquidum, used internally as sedatives and antispasmodics. When not intended for inhalation preparations of conium should not be prescribed with alkalies.

NOTE.—Unstandardised preparations of conium vary greatly in strength, but the liquid extract of conium is adjusted to contain 1 per cent. of alkaloids, thus forming a preparation of uniform potency.

## CONIINA.

### CONIINE.



*Synonyms.*—Conine; Conicine; Cicutine.

Coniine, or  $\alpha$ -propyl-piperidine,  $\text{C}_8\text{H}_9(\text{C}_3\text{H}_7)\text{NH}$ , is a liquid alkaloid found in all parts of the hemlock, *Conium maculatum*, but more especially in the immature fruit, in combination with malic acid. It may be obtained by distilling the crushed seeds with weak solution of potassium hydroxide over a steam-bath, neutralising the distillate obtained with hydrochloric acid, evaporating the solution to dryness, adding excess of potassium hydroxide to the alkaloidal salt, extracting the base thus liberated with ether, and finally purifying by distillation in a current of hydrogen. By the action of sodium on an alcoholic solution of allyl-pyridine, which is a liquid product of the action of paraldehyde on picoline, coniine may be prepared synthetically.

It occurs in the form of an almost colourless liquid with a penetrating mouse-like odour and an acrid taste, volatile, dextro-rotatory, and becoming brown on exposure to the air. Soluble in water (1 in 100), alcohol, and ether; also soluble in chloroform, benzene, amyl alcohol, and acetone, but only slightly soluble in carbon bisulphide. The aqueous solution has an alkaline reaction. The base takes up 25 per cent. of water, and the cold saturated



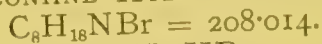
solution becomes turbid on warming. Specific gravity, 0.890. Boiling-point, 166°. On cooling, it congeals to a crystalline mass which melts at  $-2^{\circ}$ . It is a powerful base, and unites with acids to form stable crystalline salts. With concentrated sulphuric acid it gives first a blood-red colour, and then green. Potassium-cadmium iodide yields an amorphous precipitate, thus distinguishing it from nicotine, which yields a crystalline precipitate. Solution of coniine is not precipitated by platinic chloride, but solutions of nicotine are. A further distinguishing test is to add 1 drop of a concentrated alcoholic solution of phenolphthalein to a solution of either base; with coniine a red colour is developed, but with nicotine there is no reaction.

Coniine depresses the medulla and the motor nerve endings, so that after large doses death results from respiratory paralysis, which is mainly central—that is, the medulla is paralysed before the nerves. On the circulatory system coniine acts very like nicotine, in that it paralyzes autonomic nerve-cells, after an initial stimulation, and so lowers blood-pressure from paralysis of the splanchnics, and quickens the heart from paralysis of the vagi. It has been used in chorea, mania, paralysis agitans, tetanus, and strychnine poisoning for its depressant action on the motor nerves, but in this respect it is inferior to curare. In spasmodic affections such as laryngismus, whooping-cough, and asthma, it is also employed. To allay cough and bronchial spasm it is best given as an inhalation. Externally, it is sedative, and especially valuable in pruritis ani and to relieve the pain of fissures, ulcerated hæmorrhoids, etc. The pure alkaloid is rarely used internally, coniine hydrobromide or hydrochloride being preferred. Pessaries containing 3 centimils ( $\frac{1}{2}$  minim) or more of coniine in each are prepared with a glyco-gelatin basis. In cases of poisoning by coniine or its salts, emetics should be administered, while restoratives and ice will be found useful. As an antidote, give strong tea or 1 to  $1\frac{1}{2}$  grammes (15 to 20 grains) of tannic acid in aqueous solution.

*Dose.*—1 to 4 milligrams ( $\frac{1}{64}$  to  $\frac{1}{16}$  grain) or more.

### CONIINÆ HYDROBROMIDUM.

CONIINE HYDROBROMIDE,



Coniine hydrobromide,  $\text{C}_8\text{H}_{17}\text{N}$ , HBr, a salt of a base found in hemlock, may be prepared by passing a stream of anhydrous hydrobromic acid into an ice-cold solution of 10 of coniine in 100 of ether. The hydrobromide, being insoluble in ether, separates in crystalline state as it is formed. It is filtered off from the ether, washed with ether, dried, and finally crystallised by allowing its cold saturated aqueous solution to evaporate spontaneously in a warm place, or *in vacuo*.

It occurs in the form of colourless, transparent, glistening, rhombic crystals, or as a white crystalline powder. Soluble in water (1 in 2), alcohol (1 in 3), and ether-alcohol, but insoluble in ether. The solu-

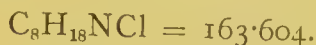
tions are colourless and neutral. Melting-point,  $210^{\circ}$  to  $214^{\circ}$ . The salt contains 61.09 per cent. of the base.

Coniine hydrobromide is the best salt of the alkaloid for medicinal use. It may be made into pills, or dissolved in syrup (without alkalies) for administration as a linctus. For children  $\frac{1}{16}$  milligram to 1 milligram ( $\frac{1}{650}$  to  $\frac{1}{65}$  grain) is a sufficient dose. For hypodermic injection a solution is prepared, containing 5 per cent. of the salt.

*Dose.*—4 to 16 milligrams ( $\frac{1}{16}$  to  $\frac{1}{4}$  grain) or more.

### CONIINÆ HYDROCHLORIDUM.

CONIINE HYDROCHLORIDE.



Coniine hydrochloride,  $\text{C}_8\text{H}_{17}\text{N} \cdot \text{HCl}$ , a salt of a base found in hemlock, may be prepared by a similar method to that described under Coniinæ Hydrobromidum, but using hydrochloric acid; or by neutralising coniine with an aqueous solution of hydrochloric acid, and crystallising by evaporating the solution *in vacuo*.

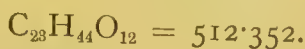
It occurs in the form of colourless crystals. Soluble in water, alcohol, and chloroform. Melting-point,  $220^{\circ}$ .

Coniine hydrochloride may be used in a similar way to the hydrobromide.

*Dose.*—4 to 16 milligrams ( $\frac{1}{16}$  to  $\frac{1}{4}$  grain) or more.

### CONVALLAMARIN.

CONVALLAMARIN.



Convallamarin,  $\text{C}_{23}\text{H}_{44}\text{O}_{12}$ , is a glucoside found in *Convallaria majalis*. It may be obtained by boiling the entire plant first with water and then with alcohol. The extract thus obtained is freed from resinous bodies by means of lead acetate, filtered, and then precipitated with tannic acid. The tannic acid precipitate is collected and extracted with alcohol, the alcoholic solution treated with lead hydroxide, and the filtrate, after removal of lead by hydrogen sulphide, evaporated. The crude product is purified by repeated precipitation by tannic acid.

It occurs as a yellowish-white, crystalline powder, with a bitter taste. Readily soluble in water and alcohol, slightly soluble in ether, insoluble in chloroform and amyl alcohol. It is split up by heating with diluted acids into glucose and convallamaretin. If it be moistened, and then treated with sulphuric acid, a violet colouration is produced, which disappears on the addition of water.

Convallamarin has a digitalis-like action on the heart and circulation. It is used as a cardiac tonic and diuretic, and has been recommended as more uniform and certain in its action

than tincture of convallaria (see *Convallariæ Flores*). Pills may be prepared for internal use, or a solution for hypodermic use containing 10 milligrams ( $\frac{1}{8}$  grain) in 6 decimils (10 minims). In cases of poisoning by convallamarin, administer emetics, and apply the stomach-pump; atropine and the nitrites may prove useful.

*Dose*.—1 to 9 centigrams ( $\frac{1}{8}$  to  $1\frac{1}{2}$  grains); subcutaneously, 5 to 20 milligrams ( $\frac{1}{12}$  to 3 grain).

## CONVALLARIÆ FLORES.

CONVALLARIA FLOWERS.

*Synonym*.—Lily of the Valley.

*Convallaria* flowers are obtained from *Convallaria majalis*, Linn. (N.O. Liliaceæ), a small plant, with a perennial creeping rhizome, indigenous to England, and distributed over Europe, North America, and Northern Asia. The whole plant is collected when in flower, and dried for medicinal use, but the inflorescence is said to be the most active part of the herb.

The inflorescence is a scape which bears three to eight pedicellate, campanulate white flowers. When dried it becomes brownish-yellow. The perianth has six recurved teeth, and bears six anthers on its inner surface. The ovary is superior and three-celled, and contains from four to six ovules in each cell, the fruit being a berry, and becoming red when ripe. The dried flowers have a slight, fragrant odour and a bitter taste.

The chief constituents of the drug are two glucosides, convallamarin and convallarin. Convallamarin,  $C_{23}H_{44}O_{12}$ , has been obtained as a white crystalline powder with a bitter taste; convallarin,  $C_{34}H_{62}O_{11}$ , is also crystalline.

*Convallaria* is used chiefly in the form of tincture, which may be prescribed in the same manner as *Tinctura Digitalis*. The difference between the action of convallaria and that of digitalis has not yet been defined. An extract and a liquid extract of convallaria are also prepared.

*NOTES*.—*Convallaria*, U.S.P., consists of the dried rhizome and roots. The rhizome is of varying length, and about 3 millimetres thick. It is cylindrical, wrinkled, whitish, or pale brown, and marked with circular scars. The nodes are annulated and bear the scars of roots, or the long, thin, tortuous branched roots. The fracture is fibrous, and exhibits a white interior. The odour is slight, the taste sweet, yet bitter and slightly acid. It contains the same constituents as the flowers. Average dose is 5 decigrams ( $7\frac{1}{2}$  grains).

## CONVALLARIN.

CONVALLARIN.



Convallarin,  $C_{34}H_{62}O_{11}$ , is a glucoside found in *Convallaria majalis*, and may be obtained from the alcoholic extract of the residue from which the convallamarin has been removed with



water. The alcoholic solution is treated with lead acetate, the filtrate freed from lead by hydrogen sulphide, and crystallised by concentration.

It occurs in the form of rectangular prisms, or as a crystalline powder, and has an acrid taste. Slightly soluble in water; freely soluble in alcohol; insoluble in ether. The aqueous solution froths like soap and water when shaken. By long boiling with diluted acids it is split up into sugar and convallaretin, which separates in crystalline form, and is soluble in ether.

Convallarin causes in man gastric pain, nausea, and diarrhœa; it is very little used.

*Dose*.—1 to 3 decigrams (2 to 5 grains).

### COPAIBA.

#### COPAIBA.

*Synonym*.—Copaiva.

Copaiba is an oleo-resin obtained from the trunk of *Copaifera Lansdorfii*, Desf. (N.O. Leguminosæ), and other species of *Copaifera*, Linn., large trees indigenous to Brazil and the north of South America. The oleoresin is secreted in schizogenous ducts, which subsequently form large lysigenous cavities in the trees; it is collected by boring into the base of the trunk, and allowing the oleoresin to drain out. It is exported from Para, Maranhão, Maracaibo, Savanilla, etc., which towns give their names to the commercial varieties of the drug.

The several commercial varieties of copaiba vary considerably in appearance and composition, Para copaiba being a thin, transparent, yellowish liquid, whilst Maracaibo copaiba is viscid, brownish-yellow, and slightly fluorescent. All the varieties have a characteristic aromatic odour, and an acrid, rather bitter taste. Specific gravity, 0.916 to 0.993 (about 0.950 to 0.995 at 25°). Soluble in alcohol (1 in 1), glacial acetic acid (1 in 2), and benzin (1 in 4), the solution in benzin yielding only a filmy deposit on standing. The oleoresin is miscible in all proportions with absolute alcohol, ether, carbon bisulphide, fixed oils, and volatile oils.

Copaiba consists of varying proportions of volatile oil and resin, but to comply with official requirements not less than 40 per cent. of volatile oil must be present. The boiling-point of the latter ranges from 250° to 275°, the specific gravity varies from 0.900 to 0.910, and optical rotation  $-7^{\circ}$  to  $-35^{\circ}$ . The resin obtained by heating the balsam in a shallow dish until the oil has been completely dissipated is a hard, brittle mass, which consists chiefly of amorphous resin acids, accompanied by small quantities of crystalline resin-acids and indifferent resenes, the nature of these constituents varying in the different varieties of balsam. The chief adulterants of copaiba are castor and other fixed oils, volatile oils, and gurjun balsam, so called. Fixed oils render the resin left after the removal of the volatile oil tough and difficult to powder. Volatile oils, such as

turpentine, may be detected by the characters of the volatile oil distilled from the drug. Gurjun "balsam," or wood oil, an oleoresin obtained from *Dipterocarpus turbinatus*, Gaertn. (N.O. Dipterocarpeæ), and other species, resembles copaiba in odour and taste, but is generally much darker in colour, and fluorescent. Its presence in copaiba may be recognised by adding 2 decimils to a mixture of 15 mils glacial acetic acid (according to Kebler, 1 mil) and 2 decimils of nitric acid, a purplish or reddish colouration denoting gurjun balsam, or by dissolving 1 decimil of copaiba in 10 decimils of carbon bisulphide, and adding 0.5 decimil of a cooled mixture of equal parts of nitric and sulphuric acids; when in the presence of gurjun balsam a transient violet colour is produced. The official description of copaiba permits the use of varieties very rich in volatile oil, such as the Para balsam, but the thicker balsams, such as Maracaibo, containing about 40 to 50 per cent. of volatile oil, are generally preferred. Sophistication often takes the form of admixing a cheaper, thin balsam with a more valuable thick one, and this is difficult to detect. The official range of optical rotation ( $-28^{\circ}$  to  $-34^{\circ}$ ) refers to a 200 millimetre instead of a 100 millimetre tube, and is too narrow,  $-7^{\circ}$  to  $-35^{\circ}$  for a 100 millimetre tube being more correct. African copaiba oil is dextro-rotatory, and its presence would therefore diminish the lævo-rotation of genuine oil or convert it into a dextro-rotation. Gurjun balsam oil is more strongly lævo-rotatory, and hence its presence would increase the figure to  $-50^{\circ}$  or  $-60^{\circ}$ . The acid number varies usually in thick balsams from 77 to 83, and the ester number does not exceed 10. One gramme of copaiba shaken with 10 mils of solution of ammonia and set aside for twenty-four hours will become turbid, but should not gelatinise (limit of resin).

The action of copaiba is that of the volatile oil, which differs in no important particular from other volatile oils. It is carminative, but is in the main used for its effects during excretion by the bronchioles, skin, and kidneys. It is especially used in chronic inflammation of the genito-urinary tract both for its mildly stimulant action and its antiseptic properties. In chronic bronchitis, especially where there is much expectoration, it acts well. On account of its disagreeable taste copaiba is commonly prescribed in gelatin capsules, which contain from 3 to 18 decimils (5 to 30 minims) in each. Pills may be prepared from the thicker varieties of copaiba by the addition of 6 per cent. of magnesia, giving the mass time to set before rolling out. Emulsions of copaiba (see *Mistura Copaibæ*) may be prepared with solution of potash, which saponifies the oleoresin, or with mucilage of acacia. Miscible solutions are prepared from copaiba, alone, or combined with sandal wood oil, cubebs, and buchu. Oil of copaiba is given in capsules or emulsified with powdered acacia and dispensed as a mixture. Resin of copaiba, obtained by distilling off the volatile oil from the oleoresin, may also be emulsified in the same way as the oil, but is generally dispensed in capsules (6 decigrams, 10 grains) in each. The resin

is used as a diuretic, and should be distinguished from the oleo-resin.

*Dose*.—2 to 4 mils (30 to 60 minims).

## COPAL.

### COPAL.

*Synonyms*.—Zanzibar Copal; Gum Animi.

Copal or gum animi is a fossil resin obtained from *Trachylobium Hornemannianum*, Hayne (N.O. Leguminosæ), and found on the east coast of Africa. It is dug up by the natives and brought to Zanzibar, where it is prepared for the market by cleaning it from the dirt with which it is encrusted.

It occurs in pieces of very varying size and of pale yellow to deep reddish-brown or greenish-red colour. It is usually transparent or semi-transparent, the surface being warty, or longitudinally striated or smooth. It consists chiefly of trachylolic acid (80 per cent.), associated with isotrachylolic acid (4 per cent.), and copal resenes (6 per cent.), together with volatile oil, bitter principle, etc. It is entirely soluble in alcohol, but partially only in benzol, chloroform, glacial acetic acid, or ether. Specific gravity about 1.06.

Zanzibar copal is used principally in the manufacture of varnishes. For this purpose it is heated until frothing ceases, when linseed oil is added and the mixture again heated to about 500° F., the thick liquid so produced being dissolved in oil of turpentine. Under the name Gum Animi, it is occasionally ordered as an ingredient of plasters.

*NOTES*.—The term copal has been applied to a number of different resins, chiefly of fossil, but partly of recent, origin. They are the produce of very different plants, and have been obtained from different parts of the world. The chief and most important is Zanzibar copal, as described above. American copal, imported from Brazil and obtained from *Hymenæa Courbaril*, Linn., is pale brown, transparent, brittle, and of agreeable odour. Specific gravity, 1.028 to 1.082. Australian copal, or gum kauri, is obtained from *Agathis Australis*, Steud., a tree growing in the north of New Zealand. The greater part of the exported resin is fossil, and occurs in large pieces, of a pale yellow or greenish-yellow colour, with a conchoidal vitreous fracture and a balsamic odour. Specific gravity, 1.062 to 1.109, or even higher. The finer specimens are occasionally used as amber substitutes. East Indian dammar is sometimes called Manilla copal (see Dammar). West African copal is obtained from *Copaifera Guibourtiana*, Benth.

## CORIANDRI FRUCTUS.

### CORIANDER FRUIT.

*Synonyms*.—Coriandrum; Coriander.

Coriander fruit is the product of *Coriandrum sativum*, Linn. (N.O. Umbelliferæ), a plant indigenous to Southern Europe, and cultivated in England, Russia, and Morocco. It is collected when ripe and dried.

The fruit consists of two firmly united mericarps, is nearly globular, about 5 millimetres in diameter, brownish-yellow in colour,



glabrous, and crowned with the remains of calyx teeth and styles. On each mericarp five wavy primary ridges may be seen, and four more conspicuous straight secondary ridges; the transverse section exhibits two vittæ on each commissural surface, but none on the dorsal. The drug has an aromatic odour, and an agreeable, spicy taste.

Coriander fruit contains about 1 per cent. of volatile oil (specific gravity, 0.870 to 0.885), and yields about 5 per cent. of ash.

The aromatic and carminative properties of coriander fruit, due to its volatile oil, render it a suitable addition to purgative medicines to prevent griping, as in confection of senna.

*Dose of powder.*—3 to 10 decigrams (5 to 15 grains).

## COSCINIUM.

### COSCINIUM.

Coscinium consists of the dried stem of *Coscinium fenestratum*, Colebr. (N.O. Menispermaceæ), a native of India and Ceylon.

The drug occurs in large woody, cylindrical, straight pieces, sometimes as much as 10 centimetres in diameter. Externally it is yellowish-brown in colour, and longitudinally fissured, with smaller transverse fissures at intervals. Internally it is yellow, a transverse section exhibiting a large, yellow, conspicuously radiate wood, porous wood-bundles alternating with dense medullary rays, which are continued through the bast, the latter tissue being lacunous from shrinkage. The fracture is short. The drug has no odour, but a bitter taste.

The chief constituent of coscinium is the yellow crystalline alkaloid, berberine; it also contains a saponin.

Coscinium is a bitter substance with similar properties to calumba. An infusion, tincture, and concentrated liquor are prepared.

*NOTES.*—Coscinium is used in India and the Eastern Colonies as an equivalent of calumba. It is occasionally imported into London under the name of Ceylon Calumba.

## COTARNINA.

### COTARNINE.



Cotarnine,  $\text{C}_{12}\text{H}_{15}\text{NO}_4$ , is a secondary base, an oxidation product of the opium base narcotine. It may be prepared by boiling a solution of narcotine in aqueous nitric acid, cooling, filtering from the separated opianic acid and precipitating with solution of potassium hydroxide. It may be recrystallised from boiling benzene.

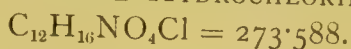
It occurs in colourless needles. Sparingly soluble in cold water, more soluble in warm water and in alcohol, the alcoholic solution

turning brown; readily soluble in ether, and also in ammonia. After repeated crystallisation, the base melts at  $125^{\circ}$  with apparent decomposition, so that the determination of the melting-point under ordinary conditions is no criterion of purity. It is precipitated by tannic acid, ferrous salts, cupric sulphate, etc. Concentrated nitric acid dissolves it with red colouration and production of oxalic acid. The base is allied to hydrastinine, and on reduction yields hydrocotarnine,  $C_{12}H_{15}NO_3$ .

Cotarnine is used chiefly in the form of its hydrochloride and phthalate.

### COTARNINÆ HYDROCHLORIDUM.

COTARNINE HYDROCHLORIDE.



Cotarnine hydrochloride,  $C_{12}H_{15}NO_4HCl$ , may be prepared by dissolving cotarnine in hydrochloric acid, and on evaporating the resulting solution the salt crystallises out.

It occurs as a pale yellow crystalline powder, very stable, and having a bitter taste. Readily soluble in water and in alcohol, forming yellow solutions; soluble also in warm absolute alcohol and precipitated from the solution in a crystalline state by ether. On dissolving 1 decigram in 3 mls of water and adding 3 drops of 15 per cent. sodium hydroxide solution a turbidity is produced, which disappears on shaking. From this clear solution the free base soon crystallises, especially on stirring with a glass rod.

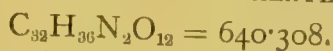
Cotarnine hydrochloride acts as a styptic and has been recommended in all forms of uterine hæmorrhage. It may be given in aqueous or alcoholic solution, or capsules, and is administered either internally or hypodermically. It is used externally in the form of wool (30 per cent.) and gauze.

*Dose.*—20 to 45 milligrams ( $\frac{1}{3}$  to  $\frac{3}{4}$  grain).

*NOTE.*—Cotarnine hydrochloride is also known under the trade-name Stypticin.

### COTARNINÆ PHTHALAS.

COTARNINE PHTHALATE.



Cotarnine phthalate,  $(C_{12}H_{15}NO_4)_2C_6H_4(COOH)_2$ , is the neutral phthalate of the cotarnine.

It occurs as a yellow or orange-red microcrystalline powder. Readily soluble in water. It contains 73 per cent. of the base cotarnine.

Cotarnine phthalate acts as a styptic and is used to arrest uterine hæmorrhage. It may be given in powders or cachets, or used in aqueous solution as a hypodermic injection.

*Dose.*—20 to 45 milligrams ( $\frac{1}{3}$  to  $\frac{3}{4}$  grain).

*NOTE.*—Cotarnine phthalate is also known under the trade-name Styptol.

**COTO.**

Coto.

*Synonym.*—Coto Bark.

Coto is a bark of unknown botanical source, derived from a large tree, probably belonging to a species of *Cryptocarya* (N.O. Laurineæ). It is obtained from Bolivia, but is often replaced in commerce by a similar bark exported from Para and called paracoto bark.

The bark occurs in flat or slightly curved heavy pieces, about 60 centimetres long, 6 centimetres broad, and 8 to 14 millimetres thick. The external surface is of a cinnamon-brown colour, with occasional white patches, and deep longitudinal fissures and transverse cracks. The inner surface is brown and coarsely striated. The fracture is short and granular in the outer part of the bark, but coarsely fibrous elsewhere. The transverse section exhibits a thin brown cork and a narrow brown cortex, separated from the thick bast by a line of sclerenchymatous cells; the bast also contains groups of sclerenchymatous cells. The bark has a characteristic odour and a pungent taste.

True coto bark contains cotoin, a crystalline powder, which yields a red colour with nitric acid. The chief constituent of paracoto bark is paracotoin, a crystalline bitter principle, which gives a yellow colour with nitric acid. Other constituents are leucotin, oxyleucotin, and hydrocotoin. The bark contains also a little volatile oil, resin, and tannin.

Coto bark is said to increase the appetite and the absorption of fluid by the intestinal mucosa, possibly by vaso-dilatation. It is used in the treatment of diarrhœa, marasmus, and intestinal catarrh. A tincture and a liquid extract of coto are made, the former being the better known preparation. It is prescribed with aromatic chalk powder or chalk mixture, in diarrhœa and dysentery. For use in pills or powders, the active principle cotoin is preferred.

*Dose.*— $\frac{1}{2}$  to 5 decigrams (1 to 8 grains).

**NOTES.**—Much of the commercial drug is the paracoto bark. This so closely resembles true coto that it cannot be distinguished by appearance, odour, taste, or structure. If, however, the powdered drug be shaken with ether, the ethereal solution distilled in presence of water, and the resulting aqueous solution freed from fat with petroleum spirit and evaporated to dryness, the residue will yield the colour test described above.

**COTOIN.**

COTOIN.



Cotoin, the mono-methyl ether of benzoyl-phloro-glucinol,  $\text{C}_6\text{H}_2(\text{OH}_2)(\text{OCH}_3)\text{COC}_6\text{H}_5$ , is a bitter principle obtained from true coto bark by making an ethereal extract from the powdered bark, treating it with warm benzin, and allowing the mixture to stand till clear. The clear liquid, on spontaneous evaporation, yields cotoin in crystals.



It occurs in the form of yellowish-white, acicular crystals, resembling gallic acid, or as a pale-yellow powder, bitter and acrid, its dust causing sneezing and coughing. Sparingly soluble in cold water, more soluble in hot water, alcohol, chloroform, ether, carbon bisulphide, benzol, and acetone; insoluble in benzin. Melting-point,  $130^{\circ}$  to  $131^{\circ}$ . Optically inactive. It dissolves in alkalies with a yellow colour; in sulphuric acid with a yellowish-brown colouration; in nitric acid with a blood-red colouration (distinction from paracotoin). Ferric chloride blackens a dilute solution of cotoin. It reduces silver salts in the cold, and Fehling's solution on heating.

Cotoin has the properties of coto bark, and may be given in pills, prepared with glycerin of tragacanth, or in cachets.

*Dose*.—1 to 2 decigrams (1 to 3 grains).

*NOTE*.—Methylene-dicotoin (Fortoin) is a compound of cotoin with formaldehyde, which has been recommended as a substitute for cotoin in the treatment of dysentery and the diarrhœa of phthisis. *Dose*, 25 centigrams (4 grains).

## COUMARINUM.

COUMARIN,



*Synonyms*.—Cumarin; Ortho-oxycinnamic Anhydride; Cumaric Anhydride.

Coumarin,  $\text{C}_6\text{H}_4(\text{CH})_2\text{OCO}$ , the  $\delta$ -lactone of coumaric acid, is the odorous principle of the Tonka or Tonquin bean, *Dipteryx odorata*, Willd., and *D. oppositifolia*, Willd. (N.O. Leguminosæ); it is also found in woodruff and many other plants. It may be obtained from the coarsely powdered beans by boiling with 80 per cent. alcohol, concentrating, and mixing the strong liquid with four times its volume of boiling water; the solution is filtered through a damp filter-paper to remove fat, and then set aside to cool, when the coumarin crystallises out, and may be purified by re-dissolving in hot water, decolourising with animal charcoal, and again crystallising. It may be prepared synthetically by mixing 3 of salicylic anhydride, 5 of acetic anhydride, and 4 of anhydrous sodium acetate, gently boiling for several hours in a reflux condenser, cooling, and adding water to the crystalline mass obtained; the oily liquid which separates is distilled, and the coumarin obtained is dissolved in hot water and crystallised.

It occurs in the form of colourless prismatic crystals, having a characteristic, persistent, fragrant odour, and a bitter, aromatic taste. Soluble in cold water (1 in 400), and boiling water (1 in 50); also readily soluble in alcohol, ether, chloroform, fixed oils, and volatile oils. Melting-point,  $67^{\circ}$ . It sublimes at the heat of a water-bath without decomposition, and leaves no residue on ignition. It dissolves in concentrated sulphuric acid in the cold without colouration, and is scarcely coloured on warming. In cold solution

of sodium hydroxide it dissolves with difficulty, but, on warming, it dissolves with a slight green colouration; from this solution excess of hydrochloric acid throws out coumarin in colourless needles. Acetanilide, which is used as an adulterant, may be detected by boiling 1 centigram of the sample with 1 mil of 25 per cent. hydrochloric acid, adding 2 mils of a 5 per cent. phenol solution, and then a little freshly prepared chlorinated lime solution. If acetanilide be present a red colour will appear, which, on addition of solution of ammonia in excess, changes to indigo blue.

Coumarin is used in perfumery, not only on account of its own fragrance, but for its property of fixing other odours. It is employed in pharmacy to disguise disagreeable odours, especially that of iodoform, for which purpose 1 part of coumarin is used to 50 parts of iodoform.

### CREMOR MORRHUÆ PANCREATICUS.

PANCREATISED COD-LIVER OIL CREAM.

Stronger Glycerin of Pepsin	...	...	...	4.00
Glycerin of Pancreatin	...	...	...	4.00
Cod-liver Oil	...	...	...	50.00
<i>Decomposition</i> Mucilage of Irish Moss	...	...	...	27.50
Syrup of Tolu	...	...	...	3.00
Alcohol	...	...	...	3.00
Essential Oil of Almonds	...	...	...	0.10
Distilled Water, sufficient to produce	...	...	...	100.00

*do.* Add the cod-liver oil to the ~~mucilage~~ of Irish moss, and beat together until thoroughly mixed. Then add separately the glycerin of pancreatin, glycerin of pepsin, and syrup of tolu to the emulsion, and stir well after each addition. Next dissolve the essential oil of almonds in the alcohol, and add the solution to the mixture, with sufficient distilled water to produce 100.

This preparation contains 50 per cent. of cod-liver oil, and is an easily assimilated emulsion.

*Dose.*—8 to 30 mils (2 to 8 fluid drachms).

### CREOSOTI CARBONAS.

CREOSOTE CARBONATE.

Creosote carbonate is not a compound of definite composition, but a mixture of the carbonates of the various constituents of creosote, viz., cresol, guaiacol, and creosol. It may be prepared by conducting a stream of carbonyl chloride (phosgene gas) into a solution of creosote in sodium hydroxide solution, washing the oily liquid which separates with weak alkaline solution, and then with water.

It occurs in the form of a clear, colourless or amber-coloured, viscid liquid of about the consistence of honey at ordinary tempera-

tures, fluid when hot, neutral, and having a very slight odour and a sweetish oleaginous taste, suggesting after a time that of creosote. Insoluble in water, glycerin, or weak alcohol; soluble in alcohol, ether, chloroform, benzene, amyl alcohol, and volatile and fatty oils. Specific gravity, 1.165 to 1.168. It burns in the air without leaving any residue. On long standing in the cold, crystals of guaiacol carbonate separate, but these go into solution again on warming. Boiled with solution of potassium hydroxide, it evolves the odour of creosote. It contains about 90 per cent. of creosote.

Creosote carbonate passes through the stomach unchanged, but is decomposed by the alkaline intestinal secretions with liberation of creosote. It is, therefore, not an efficient substitute for creosote when it is desired to produce its effects in the stomach. It is almost tasteless and odourless, and may be conveniently given in warm milk. Capsules are also prepared, containing 12 to 90 centimils in each (2 to 15 minims). Large doses (up to 4 mils, or one teaspoonful) are sometimes given.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

NOTE.—Creosote carbonate is also known under the trade-name Creosotal.

## CREOSOTUM.

### CREOSOTE.

*Synonym.*—Beechwood Creosote.

Creosote is a mixture of guaiacol, creosol, and other phenols, obtained by the fractional distillation of wood tar. The variety known as beechwood creosote is best suited to pharmaceutical requirements, and is that which is official. It contains a high proportion of guaiacol and forms a clear mixture with glycerin.

It occurs as a colourless or yellowish liquid with a strong characteristic odour and burning taste; neutral or not more than faintly acid to litmus. Slightly soluble in cold water (about 1 in 150); very soluble in alcohol, ether, chloroform, glycerin, and glacial acetic acid. Specific gravity, not below 1.079 (about 1.072 at 25°). As a rule it does not distil completely between 200° and 220°, but the greater part should do so. It should be free from phenol and other less volatile liquids. Good samples are almost optically inactive, and may be slightly dextro-rotatory. If 1 mil of creosote be mixed with 10 mils of a solution of potassium hydroxide (1 in 5) in absolute alcohol, a solid crystalline mass will form (difference from phenol and coal-tar creosote and limit of the former). On mixing 2 mils of creosote with 10 mils of normal sodium hydroxide solution a clear pale yellow liquid results, which remains unclouded on diluting with 50 mils of water (absence of neutral oils). If 1 mil of creosote be cautiously and gently shaken with 2 mils of petroleum benzin and 2 mils of freshly prepared barium



hydroxide solution until a uniform mixture is produced, upon complete separation three distinct layers are visible; the middle one contains the creosote, unaltered in appearance, while the petroleum benzin should not be blue or muddy and the aqueous layer should not have acquired a red tint (absence of cœrulignol and some other high boiling constituents of wood tar).

Creosote produces burning, followed by numbness, when applied to the skin, and it is sometimes used to relieve itching. As an inhalation it is useful in phthisis, pulmonary gangrene, and fetid bronchitis. Taken by the mouth it is carminative, and a gastro-intestinal antiseptic. For internal use a solution of creosote in water flavoured with spirit of juniper and syrup is prepared (see *Mistura Creosoti*). Owing to the disagreeable taste of creosote, capsules containing from  $\frac{1}{2}$  to 6 decimils (1 to 10 minims) in each are largely used. For enclosure in capsules the creosote should first be mixed with one and a half to two volumes of almond oil, on account of its miscibility with the glycerin of the capsule mass. Capsules are also made containing creosote in combination with cod-liver oil, or the corresponding emulsion may be prepared. Pills of creosote may be prepared, containing 6 centimils (1 minim) in each, with soap and liquorice powder as excipients. For hypodermic and intra-laryngeal injection in tuberculosis, solutions of guaiacol in oil are preferred rather than solutions of creosote (see *Guaiacol*). For inhalation in phthisis and fœtid bronchitis, *Vapor Creosoti* may be used with hot water or a mixture of creosote with spirit of chloroform in equal parts, inhaled from an oro-nasal inhaler. Applied to carious teeth, creosote is deodorant and antiseptic; it is also a local anæsthetic, allaying toothache. For external use, *Unguentum Creosoti* is prepared with a paraffin base for use in parasitic skin diseases. Many compounds of creosote are prepared for medicinal use, the chief of which are creosote carbonate, creosote phosphate (*Phosote* or *Phosphote*), creosote phosphite (*Phosphotal*), and creosote valerianate (*Eosote*). These compounds usually pass through the stomach unchanged, to be broken up in the intestine with liberation of creosote.

*Dose*.— $\frac{1}{2}$  to 3 decimils (1 to 5 minims), or more.

*NOTE*.—Creosote is known in some districts as "oil of tar."

## CRETA PRÆPARATA.

PREPARED CHALK.

$\text{CaCO}_3 = 100 \cdot 1$ .

Prepared chalk is native calcium carbonate,  $\text{CaCO}_3$ , purified by elutriation.

It occurs as a soft white powder or in white friable masses. Insoluble in water and alcohol, soluble in dilute acids, leaving only the slightest residue. It should be free from barium carbonate, and contain not more than traces of iron, aluminium, magnesium, phosphates, sulphates or silica.

Prepared chalk is used internally with other astringents and aromatics against diarrhœa. *Mistura Cretæ* and *Pulvis Cretæ Aromaticus* are its most suitable forms; the latter may be given as a powder or mixture, with or without opium. Externally, prepared chalk is protective and mildly astringent. It may be used as a dusting powder with zinc oxide or calamine, or as *Unguentum Cretæ*. As a basis for tooth powders, precipitated chalk is usually preferred rather than prepared chalk.

*Dose*.— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

## CROCUS.

SAFFRON.

*Synonym*.—Hay Saffron.

Saffron consists of the dried stigmas and the tops of the styles of *Crocus sativus*, Linn. (N.O. Irideæ), a plant cultivated in Spain, and to a less extent in France, Austria, and Italy. The flowers are collected in the autumn, and the stigmas and upper parts of the styles are separated and dried.

The drug occurs in loosely matted, dark reddish-brown masses, proving on examination to be composed of single stigmas or three stigmas attached to a short portion of the yellow style. Floated on water the stigmas are seen to be about 25 millimetres long, and of a characteristic tubular shape, irregularly notched at the top. Saffron is flexible and unctuous to the touch when fresh, becoming dull and brittle when quite dry. It has a characteristic odour and bitterish taste. Placed in warm water it should colour the liquid brilliant yellow, but no white or coloured powder should be deposited. When pressed between thin sheets of paper it should leave no oily stain. On incineration with free access of air saffron should not deflagrate. It should not lose more than 12.5 per cent. of moisture when dried at 100°. It contains about 13 per cent. of water-soluble matter, and yields about 6 per cent. of ash.

Saffron contains about 1 per cent. of volatile oil, an amorphous red colouring matter, crocin or polychroit (resembling and probably identical with carotin), and a colourless, bitter principle, picrocrocin. Crocin, like carotin, is coloured deep blue by concentrated sulphuric acid, and green by nitric acid.

Saffron is used almost entirely for its colouring and flavouring properties. *Tinctura Croci* is a permanent preparation of saffron, preserving both its colour and flavour. *Syrupus Croci*, as commonly made, has a brilliant colour when fresh, but deposits on keeping, and is surpassed by *Glycerinum Croci*, an excellent colouring agent in the proportion of 6 decimils to 30 mils (10 minims to 1 ounce) of mixture.

*Notes*.—The high price of saffron has led to its adulteration in the following ways:—(1) By substituting some substance for the stigmas, such as the florets of the safflower, *Carthamus tinctorius*, Linn., the stamens or portions of the

perianth of the saffron crocus or of other plants, calendula florets, etc., etc., all of which may be detected by examining the drug after expansion on water. (2) By recolouring exhausted saffron with aniline dyes, logwood, etc., which may be detected by their solubility in various liquids, such as ether, petroleum spirit, etc., and by the colour they impart to the water on which the saffron is thrown. (3) By increasing the weight of the drug by the addition of various substances. Oil, which also improves the appearance, may be detected by the stain left on paper; other substances by the percentage of ash, moisture, and water-soluble matter.

## CUBEBAE FRUCTUS.

### CUBEBS.

*Synonyms.*—Cubeba; Cubeb; Tailed Pepper.

Cubebs are the dried, full-grown, unripe fruits of *Piper Cubeba*, Linn. (N.O. Piperaceæ), a plant indigenous to the Malay Archipelago. They are collected when green, stripped from the rachis, and dried in the sun.

The fruits are greyish-black in colour when dry, nearly globular in shape, sometimes depressed at the base, and about 4 millimetres in diameter. The pericarp is reticulately wrinkled, and abnormally prolonged at the base into a slender, firmly attached stalk. Within there is a single seed attached by its base to the pericarp. The odour is strong, spicy, and characteristic; the taste strong, spicy, and somewhat bitter. The crushed fruit imparts a crimson colour to sulphuric acid.

The chief constituent of cubebs is about 14 per cent. of volatile oil; the drug also contains white, amorphous cubebic acid (0.96 per cent.), which gives a crimson colour with sulphuric acid, and colourless, crystalline cubebin. It leaves on incineration about 6 per cent. of ash, and by extraction with ether yields about 20 per cent. of oleoresin.

Cubebs has an action similar to, but weaker than, that of copaiba. It is used internally as an antiseptic diuretic, and as a stimulant to the genito-urinary mucous membrane. Cubeb powder is taken enclosed in wafer paper or well stirred up with water. It is also made into a paste with copaiba balsam, sometimes with the addition of sandal-wood oil, and administered in a wafer. Tinctura Cubebæ and Extractum Cubebæ Liquidum are alcoholic preparations. The volatile oil of cubebs may be dispensed in mixture form with mucilage of acacia, or enclosed in gelatin capsules. Oleoresina Cubebæ is also best dispensed in capsule form. Cubebs is much used as a stimulant expectorant to the bronchial mucous membrane, and is the basis of some advertised bronchial lozenges. Trochiscus Cubebæ contains 30 milligrams ( $\frac{1}{2}$  grain) of cubebs in each. For inhalation, Vapor Cubebæ is used with hot water.

*Dose.*—2 to 4 grammes (30 to 60 grains).

*NOTES.*—Other Piperaceous fruits are not infrequently substituted for cubebs, but the genuine may be distinguished by the sulphuric acid test taken in conjunction with their anatomical structure. The inner layer of the pericarp consists of a single (here and there doubled) row of radially elongated rectangular sclerenchymatous cells. The drug should not contain the rachis of the inflorescence, as this yields only about 1.7 per cent. of volatile oil, nor should too many immature fruits be present.



**CUCURBITÆ SEMINA PRÆPARATA.****MELON PUMPKIN SEEDS.**

Melon pumpkin seeds are the product of cultivated plants of *Cucurbita maxima*, Duch. (*Cucurbita Pepo*, Linn.), (N.O. Cucurbitaceæ), a native of the Levant. The ripe seeds should be deprived of both testa and tegmen while fresh.

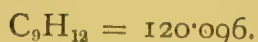
The seeds are ovate in shape, and flat, measuring about 8 to 20 millimetres in length, 9 to 12 millimetres in breadth, and about 4 millimetres in thickness, and have a flat ridge and shallow groove round the edge. The testa is white, brittle, and finely pitted. The kernel consists of two white, oily cotyledons, with a short radicle. When fresh the seeds have a faint odour, and a slight taste. For medicinal purposes the testa and tegmen are removed, and the seeds should not be used if more than a month old.

The chief constituent of the seeds and the one to which the activity of the drug has been ascribed is an acrid resin. The seeds also yield about 30 per cent. of a reddish fixed oil, together with proteids, sugar, and starch.

Melon pumpkin seeds are employed as a tænicide. Their use should be preceded by the administration of a saline purge. The patient fasts and takes a mixture of about 85 grammes (3 ounces) of coarsely crushed seeds mixed with a pint of water suitably flavoured, in three or four doses, extending over six to eight hours. After an interval of a few hours a purgative dose of castor oil is given.

*Dose.*—85 to 112 grammes (3 to 4 ounces).

*NOTE.*—Melon pumpkin seeds are official in the Mediterranean Colonies.

**CUMENUM.****CUMENE.**

*Synonyms.*—Cumol; Pseudocumene; Isopropyl-benzene.

Cumene,  $\text{C}_6\text{H}_5\text{CH}(\text{CH}_3)_2$ , is a hydrocarbon, methyl-ethyl-phenol, obtained by the fractional distillation of coal tar; it may also be obtained by boiling benzene with isopropyl and aluminium chlorides.

It occurs as a colourless liquid, soluble in alcohol and benzene. When pure its boiling-point is  $169\cdot8^\circ$ , and specific gravity,  $0\cdot853$ . The commercial liquid boils between  $160^\circ$  and  $170^\circ$ .

Cumene resembles xylol in its general properties. It is used for the sterilisation of catgut ligatures for surgical purposes, its high boiling-point rendering it especially suitable for this purpose.

**CUMINI FRUCTUS.****CUMMIN FRUIT.**

Cummin fruit is the product of *Cuminum Cyminum*, Linn. (N.O. Umbelliferae), a small plant, indigenous to the Upper Nile territory, and cultivated in N. Africa, Sicily, Malta, and India. The plants are cut and threshed when the fruit is ripe.

The fruit is a brown cremocarp, about 4 to 6 millimetres long, of an elongated oval shape, tapering towards both base and apex. The mericarps are sometimes united, but often free. Each has five longitudinal primary ridges running from base to apex, and alternating with them are secondary ridges which are flatter and bear short emergences. The transverse section of the mericarp when examined under a lens exhibits an oily endosperm and six vittæ, four of the vittæ being situated on the dorsal surface, and two on the commissural surface. The fruits resemble caraways, but the mericarps are straight instead of being curved, and the odour and taste are also less agreeable.

The fruits contain about 3 to 4 per cent. of a volatile oil, the chief constituent of which is cumic aldehyde (cuminol). They yield about 8 per cent. of ash.

Cummin fruit is used chiefly as a carminative in veterinary medicine.

**CUPREINÆ SULPHAS.****CUPREINE SULPHATE.**

Cupreine sulphate,  $(\text{C}_{10}\text{H}_{22}\text{N}_2\text{O}_2)_2\text{H}_2\text{SO}_4, 6\text{H}_2\text{O}$ , is the salt of a base contained in cuprea bark (*Remijia* sp.). It may be obtained by dissolving the crude quinine sulphate from the cuprea bark in diluted sulphuric acid, adding excess of sodium hydroxide, shaking out the precipitated quinine with ether, warming the aqueous liquid and neutralising with sulphuric acid. Cupreine sulphate separates on cooling.

It occurs in minute white crystals, very slightly soluble in water (1 in 813), readily soluble in dilute acids, insoluble in a saturated solution of sodium sulphate. On adding chlorine and then ammonia to a solution a dark green colour is obtained.

Cupreine sulphate is nearly allied to quinine sulphate, and has been used for similar purposes.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**CUPRI NITRAS.****COPPER NITRATE.**

*Synonym.*—Cupric Nitrate.

Copper nitrate,  $\text{Cu}(\text{NO}_3)_2, 3\text{H}_2\text{O}$ , may be prepared by dissolving copper oxide in nitric acid and crystallising at a temperature not below  $21^\circ$ .

It occurs in the form of a deliquescent, blue crystalline powder, or sometimes in larger blue crystals. Very soluble in water and alcohol. Melting-point,  $114.5^{\circ}$ . It should be free from sulphates and from the impurities mentioned under Cupri Sulphas, and should be kept in well-stoppered bottles.

Copper nitrate is used as a substitute for the sulphate in astringent lotions and injections. It is rarely given internally, but has been given in pills, the salt being well triturated with an inert vegetable powder, and massed with glycerin of tragacanth. Glucose should not be used as an excipient, as it reduces the copper salt.

*Dose*.—5 to 10 milligrams ( $\frac{1}{12}$  to  $\frac{1}{8}$  grain).

### CUPRI OLEAS.

#### COPPER OLEATE.

Copper oleate is prepared by dissolving 1 of copper sulphate and 2.5 of hard soap separately, each in 50 of distilled water, mixing the two solutions, and heating till the precipitate melts and agglomerates; the product is then washed with boiling water, collected, and dried.

It occurs in dark green or greenish-blue masses or powder. It is insoluble in water, but soluble in ether. It contains about 10 per cent. of cupric oxide.

Copper oleate is commonly used as Unguentum Cupri Oleatis, an astringent, antiseptic, and parasiticide ointment, recommended especially for ringworm. It may be mixed with soap plaster, and applied spread on leather, where this is a more convenient form of application than the ointment, also for the treatment of warts, corns, and bunions.

### CUPRI SUBACETAS.

#### COPPER SUBACETATE.

*Synonyms*.—Copper Oxyacetate; Ærugo; Viridis; Viride Æris.

Copper subacetate or verdigris is prepared in the wine districts of Southern Europe, by the action of grape refuse undergoing acetous fermentation on copper. Copper plates, when new, are rubbed over with a solution of verdigris, heated, and then placed in earthen vessels alternately with layers of the fermented refuse, a layer of the latter being at the bottom and top of the vessel. The vessels are then covered and left at rest for some time. When the plates have become encrusted they are taken out and alternately moistened and dried, finally scraped and the product dried in bags in the sun. The composition of the salt varies, but it consists mostly of hydrated oxyacetate of copper, and contains between 43 and 50 per cent. of cupric oxide. Two varieties occur in commerce, the French, which is somewhat bluish in colour and has the composition  $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2$ ,  $\text{Cu}(\text{OH})_2$ ,  $5\text{H}_2\text{O}$ , and the English, German, or Swedish, which is greenish and consists principally of  $[\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2]_2 + \text{Cu}(\text{OH})_2 + 5\text{H}_2\text{O}$ .



It occurs as a greenish-blue powder, or in heavy, hard masses of a greenish-blue colour, containing considerable quantities of small crystals, and having an earthy, somewhat crystalline fracture and a slight acetous odour. It is very poisonous. Partially soluble in water, with decomposition; insoluble in alcohol; completely soluble in ammonia when pure, and in diluted sulphuric, acetic, and hydrochloric acids. The chief impurities in verdigris are chalk and copper sulphate. The carbonate is detected by the salt effervescing with acid, and the sulphate is precipitated by barium chloride. Commercial varieties should not contain more than 4 or 5 per cent. of impurities, chiefly insoluble matter. It should be free from arsenic.

Copper subacetate is employed in veterinary medicine, and in the preparation of *Linimentum Æruginis*.

NOTES.—Distilled verdigris is neutral acetate of copper  $[\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2 + \text{H}_2\text{O}]$ , and may be prepared by dissolving ordinary verdigris in acetic acid. Solution of copper acetate is prepared by digesting 10 of copper subacetate with 20 of acetic acid and 10 of distilled water at a temperature not exceeding  $100^\circ$ , stirring until a dry residue is obtained, digesting the product in 80 of boiling distilled water, and adding sufficient cold distilled water to produce 100.

## CUPRI SULPHAS.

### COPPER SULPHATE.



*Synonym.*—Cupric Sulphate.

Copper sulphate,  $\text{CuSO}_4, 5\text{H}_2\text{O}$ , is prepared from copper pyrites, or may be obtained by the interaction of diluted sulphuric acid and cupric oxide or copper.

It occurs in large, deep-blue crystals, slowly efflorescing in dry air. Soluble in water (1 in 3.5) and glycerin (1 in 2.5), but insoluble in alcohol. The aqueous solution is acid to litmus. It should be free from lead, arsenium, zinc, and aluminium, and contain not more than a trace of iron.

Copper sulphate is used internally as an astringent in small doses in pill form, massed with glycerin of tragacanth not with glucose: combined with opium and quinine, it is used in dysentery and tropical diarrhœa. In large doses it is a prompt emetic. It is of great value in phosphorus poisoning, where it acts not only as an emetic, but, by forming an insoluble copper phosphide, it prevents absorption. Externally, copper sulphate is used in solid form as a caustic to warts and ulcers. Sticks of the salt are prepared for this purpose, and are mounted in boxwood holders for gynaecological use. Copper sulphate in powder is a useful dental astringent and antiseptic for application to discharging gums. Weak solutions of copper sulphate are used for their effect upon mucous membranes in checking excessive discharges. For ophthalmic use  $\frac{1}{4}$  to  $\frac{1}{2}$  per cent. solutions are suitable; for urethral injections  $\frac{1}{2}$  to 1 per cent. solutions. Copper sulphate is much used as Fehling's and Pavy's solutions for the detection and

determination of glucose in urine and other fluids. Lapis Divinus or Cuprum Aluminatum is a fused mixture of copper sulphate, potassium nitrate, and alum, with a little camphor. A  $\frac{1}{2}$  per cent. solution of Lapis Divinus is used as an eye-wash. Copper sulphate is incompatible with alkalies and their carbonates, lime water, and vegetable astringents. The best emergency antidote for poisoning by salts of copper is white of egg.

*Dose*.—15 to 120 milligrams ( $\frac{1}{4}$  to 2 grains); as an emetic, 3 to 6 decigrams (5 to 10 grains).

*NOTES*.—Solution of copper sulphate is prepared by dissolving 10 of copper sulphate in sufficient distilled water to produce 100. Solution of copper ammonio-sulphate is prepared by dissolving 5 of copper sulphate in 80 of distilled water, cautiously adding solution of ammonia until the precipitate first formed is nearly dissolved, filtering, and adding sufficient distilled water to produce 100.

## CURARA.

### CURARE.

*Synonyms*.—Woorara; Woorari; Woorali; Ourari; Urari.

Curare is an extract made from the bark of *Strychnos toxifera*, Schomb., and other species of *Strychnos*, probably mixed with other, possibly inert, drugs. It is prepared as an arrow poison by tribes of Indians in British Guiana, French Guiana, Venezuela, Northern Brazil, and the United States of Colombia. The manner in which it is prepared is not exactly known, but an infusion or decoction is probably made, evaporated to a suitable consistence, and poured into gourds, bamboos, or earthen jars.

The drug varies considerably. It was formerly obtained as a thick syrup, but it now occurs in commerce as a brittle blackish extract, resembling black catechu in appearance, and often containing small cavities. When imported in bamboo it is dark brown and granular, and frequently exhibits small crystals. It has no odour, but a very bitter taste.

The constituents and strength of the drug vary in the different specimens. Gourd curare contains the poisonous alkaloid curarine,  $C_{19}H_{26}N_2O$ , which has been obtained as a yellowish-brown powder with a bitter taste. Curine,  $C_{18}H_{19}NO_3$ , which is less poisonous than curarine, has also been obtained from it. Tube curare from the Amazon contains the alkaloids tubocurarine and curine, and jar curare the alkaloids protocurarine, protocurine, and protocuridine. The principal effect of curare is to paralyse the motor nerve-endings in striped muscle, death occurring from respiratory failure. In larger doses it also paralyzes nerve cells. Bamboo curare yields about 84 to 88 per cent. to water; gourd curare, 34 to 75 per cent.; pot curare 50 to 87 per cent.

Curare is almost inert when taken by the mouth, probably owing to its rapid excretion and to the destructive action of the gastric juice. It is used medicinally by hypodermic injection as *Injectio Curaræ Hypodermica* in the treatment of tetanus, hydrophobia, and strychnine poisoning, but the dose is never pushed to the stage of

motor paralysis, because efficient artificial respiration is so difficult to attain. Different specimens vary in strength, and "standardised" curare should alone be used in the preparation of the injection, which must be used with great caution.

*Dose*.—3 to 30 milligrams ( $\frac{1}{20}$  to  $\frac{1}{2}$  grain).

## CURCUMA.

### TURMERIC.

*Synonyms*.—Turmeric Rhizome; Turmeric Root.

Turmeric is the dried rhizome of *Curcuma longa*, Linn. (N.O. Scitamineæ), a native of Southern Asia, cultivated largely in India, China, Java, and other tropical countries. The rhizomes are dug up after the aerial stems have died down, and are then steamed or boiled, by which their vitality is destroyed. They are finally dried in the sun, or in an oven, and sorted into "fingers," the lateral secondary rhizomes, and "bulbs," the stem-producing rhizomes; the latter are sometimes quartered or sliced to facilitate drying.

Finger turmeric occurs in long, curved, or nearly straight sub-cylindrical pieces, bluntly tapering towards either end. The pieces are compact and heavy, of a yellowish-brown colour, and marked externally with longitudinal wrinkles and transverse leaf scars. Some pieces have short branches or show the scars where these have broken off. The fracture is short, the internal surface being of a brownish-yellow waxy appearance, and of a tough and horny consistence. The transverse section exhibits a paler ring separating the stele from the cortex. Bulb turmeric resembles finger turmeric, but is shorter and thicker, and is often in quarters. The odour and taste of turmeric are aromatic and characteristic.

The chief constituents of turmeric are curcumin, a yellow crystalline body, and about 5 per cent. of a volatile oil. The rhizome also contains starch and resin, some of the starch being gelatinised owing to the method in which the drug is prepared for market. Curcumin is a yellow crystalline substance which dissolves in alcohol to form a deep yellow solution, alkalies changing the colour to reddish-brown; concentrated sulphuric acid, or better, a mixture of that reagent with alcohol, produces with tissues containing curcumin a deep crimson colouration, a reaction which is often useful in detecting the powdered drug. Boric acid changes it to reddish-brown, which, on the addition of alkalies, becomes greenish-blue.

Turmeric is an aromatic, used principally as a constituent of curry powders and other condiments. Tincture of turmeric may be used as a colouring agent, but the colour is fugitive in solution. Turmeric paper is prepared from the tincture, and used as a test for alkalies and for boric acid.

## CUSPARIÆ CORTEX.

### CUSPARIA BARK.

*Synonym*.—Angostura Bark.

Cusparia bark is obtained from *Galipea officinalis*, Hancock (N.O. Rutaceæ), a tree growing abundantly on the mountains of Venezuela.



The drug comes into commerce in quills or thin curved or channelled pieces, often 10 or 12 centimetres long, and about 2 millimetres thick. The outer corky layer is either grey and firmly adherent, or buff-coloured, spongy, and easily removed by the finger-nail. The inner surface is light brown, finely striated, and usually laminated in structure. Examined under the lens it exhibits numerous short white lines (crystals of calcium oxalate), and similar white lines may be seen in the smoothed transverse and radial sections. The fracture is short and resinous. The bark has a musty odour and bitter taste. It yields about 7 per cent. of ash on incineration.

The bark contains about 2·4 per cent. of the bitter, crystalline alkaloids, galipine, cusparine, galipidine, cusparidine, and cuspareine, the first two being the most important. It also contains certain amorphous alkaloids, a bitter crystalline principle, angosturin, which is soluble both in water and alcohol, about 1·5 per cent. of volatile oil, and a glucoside which yields a fluorescent substance when boiled with diluted sulphuric acid.

Cusparia bark is an aromatic bitter and is used as Infusum Cuspariæ and Liquor Cuspariæ Concentratus, often in combination with cinchona and aromatics. It is an important constituent of "Angostura bitters," which also contain cinchona, and other bitter substances.

NOTES.—Cusparia bark has been adulterated with nux vomica bark, but that is different in appearance, and distinguishable by the transverse section, which exhibits under the lens a distinct paler line of sclerenchymatous cells, separating the cortex from the bast. This line of cells is never found in cusparia bark, which seldom contains any sclerenchymatous tissue, other than small isolated groups of bast fibres. This characteristic structure serves to distinguish cusparia from other adulterants, such as copalchi bark (*Croton niveus*, Jacq.), Brazilian angostura bark (*Esenbeckia febrifuga*, A. Juss), etc.

## CUSSO.

### Kousso.

Kousso consists of the dried panicles of pistillate flowers of *Brayera anthelmintica*, Kunth. (N.O. Rosaceæ), a tree indigenous to North Eastern Africa, and cultivated in Abyssinia. The panicles are collected after fertilisation, and packed in cylindrical rolls or "hanks," 4 to 5 decimetres in length, bound round with a flexible stem.

The panicles are of a characteristic dull reddish colour, and more or less covered with shaggy hairs and minute glands. They are much branched, the branches springing from the axils of large bracts. The numerous shortly stalked flowers bear a two-whorled calyx, the outer sepals being large and reddish veined, the inner inconspicuous, and bending over the young fruit. The stamens are abortive. The drug has no marked odour, but a bitter and acrid taste.

The principal constituent of kousso is a crystalline body, koso-toxin, which is an extremely active vermifuge, and is apparently closely allied to filicic acid (see *Filix Mas*). Commercial kosin is a mixture of two crystalline bodies,  $\alpha$ -kosin and  $\beta$ -kosin, but neither

of these is anthelmintic. Koussou also contains the inactive bodies protokosin and kosidin, as well as tannin and resin. It yields on incineration about 5 per cent. of ash.

Koussou is an anthelmintic used especially for tapeworm, generally as Infusum Cusso; it is less certain than oil of male fern. The dose should be preceded by a purge, and taken on an empty stomach. After some hours a further brisk purge should be administered.

*Dose.*—7 to 14 grammes ( $\frac{1}{4}$  to  $\frac{1}{2}$  ounce).

*NOTES.*—Loose koussou—*i.e.*, the flowers stripped from the panicles and dried—sometimes comes into the market; it frequently contains a considerable admixture of staminate flowers, which are much less active. These may be distinguished by their greenish colour, small hairy outer sepals, and fertile stamens.

## CYDONIÆ SEMINA.

### QUINCE SEEDS.

Quince seeds are the product of *Pyrus Cydonia*, Linn. (N.O. Rosaceæ), a small tree cultivated in temperate Europe, South Africa, and elsewhere. The fruit resembles a pear, and contains five carpellary cavities in which a number of seeds are closely packed in two vertical rows.

The seeds somewhat resemble apple-pips in size and appearance. They are about 6 millimetres long, and of a dark brown colour. They are flattened on two sides owing to mutual pressure, and frequently adhere to one another by a white mucilage, which is derived from epidermal cells of the seed-coats. The seeds are pointed at one end where the hilum is situated, but are broader at the chalazal end. Transverse sections of the seed exhibit two firm, yellowish-white cotyledons, with a narrow endosperm. These have a faintly bitter taste resembling that of bitter almonds.

The chief constituent of quince seeds is about 20 per cent. of mucilage, which is contained in the epidermis of the seed-coat. The cotyledons contain fixed oil and proteids, together with a small proportion of amygdalin and emulsin.

Quince seeds have soothing and demulcent properties and are used internally in the form of a decoction. Large quantities of the decoction may be drunk in dysentery, diarrhœa, and gonorrhœa; the decoction also forms a useful adjunct to boric acid eye lotions. A mucilage of quince seeds is prepared, and has similar properties to the decoction. It is a useful suspending agent for such liquids as tincture of benzoin, and is added to toilet preparations for that purpose.

## DAMIANA.

### DAMIANA.

*Synonym.*—Turnera.

Damiana consists of the leaves of *Turnera diffusa*, Willd., var. *aphrodisiaca*, Urban (N.O. Turneraceæ), and probably other species

of *Turnera*, herbs indigenous to South-Western Texas and Mexico.

The leaves are light green in colour, about 10 to 25 millimetres long, and 5 to 10 millimetres broad. They are broadly lanceolate, and shortly petiolate, with a dentate margin having three to six teeth on each side. The surface is smooth, but the veins are prominent on the under surface. The drug often contains pieces of the small, reddish-brown woody stem. The odour and taste are aromatic. Examined microscopically the leaves exhibit long unicellular hairs, and cluster crystals of calcium oxalate.

The chief constituents are 0·5 to 1 per cent. of a greenish, volatile oil, having the odour of chamomiles, and a light-brown amorphous bitter principle, damianin. The drug also contains two resins, and 3 to 4 per cent. of tannin.

Damiana is a mild purgative and has been recommended in the treatment of sexual debility and hypochondriasis. The solid extract is prescribed in pill form, often with phosphorus and extract of *nux vomica*; the liquid extract is given in mixtures, sometimes with quinine and strychnine.

## DAMMAR.

### DAMMAR.

Dammar is a generic term for a number of different resins, of which East Indian or Singapore dammar is the only one that appears on the English market in quantity. East Indian dammar is derived from the Amboyna pine, *Dammara orientalis*, Lamb. (N.O. Coniferæ), which is cultivated in the Eastern Archipelago.

It occurs in nodules 3 to 6 millimetres in diameter, but sometimes larger; the exterior is coated with white powder, while the interior is pale amber coloured, transparent or translucent. It is readily friable and adheres only feebly on heating in the hand. It softens at about 100° and melts at about 150° to a clear liquid. The fracture is conchoidal and vitreous and usually exhibits air bubbles and vegetable debris. The odour is balsamic when the resin is fresh, but afterwards imperceptible. Specific gravity, 1·062 to 1·123. It is partly soluble in cold alcohol, moderately soluble in ether, soluble in boiling alcohol and fixed and volatile oils, chloroform, carbon bisulphide, and petroleum spirit; insoluble in acetic acid and alkalies.

Dammar consists mainly of a mixture of resins and resin acids, but also contains small amounts of a bitter principle and a volatile oil. The following has been given as a test for purity:—If 50 mils of benzene be poured on 1 gramme of finely powdered dammar and 20 mils of semi-normal solution of potassium hydroxide be added, and the mixture be set aside, well corked, for twenty-four hours, on re-titration with phenol-phthalein as an indicator, 19 to 19·3 mils of semi-normal sulphuric acid should be required, corresponding to an acid number of 20 to 30. The yield of ash on ignition should be almost infinitesimal.



The principal use of dammar is in the preparation of varnishes, but it is occasionally used as a constituent of plaster masses.

NOTE.—Dammar is sometimes known as Manilla copal or mastic. Rock dammar, obtained from *Shorea* species, is sometimes imported, and closely resembles the above, but may be distinguished by its insolubility in 60 per cent. aqueous solution of chloral hydrate, in which all coniferous resins are soluble. Kauri resin is sometimes called New Zealand dammar (see Copal).

## DATURÆ FOLIA.

### DATURA LEAVES.

Datura leaves are obtained from *Datura fastuosa*, Linn., var. *alba*, Nees, and of *Datura Metel*, Linn. (N.O. Solanaceæ), annual plants indigenous to India.

The leaves are ovate in shape, unequal at the base, and acuminate at the apex. The petioles are long, and the margin sinuate dentate, with a few spreading teeth. The larger leaves are 17 to 20 centimetres in length, and 10 to 12·5 centimetres broad. They are brownish or yellowish-green in colour, brittle, and bear scattered simple and stalked glandular hairs. The trumpet-shaped corolla, together with the stamens, is sometimes present. The drug has a slight unpleasant odour, and a bitter taste.

The chief constituent of the leaves is hyoscyne (scopolamine), only traces of hyoscyamine and atropine being present.

Datura leaves are used in India and in the Eastern and West Indian Colonies as an equivalent of belladonna and stramonium leaves. Datura cigarettes, as sold in this country for smoking in cases of asthma, are usually prepared from the leaves of *Datura Stramonium* and *Datura Tatula*.

## DATURÆ SEMINA.

### DATURA SEEDS.

Datura seeds are the product of *Datura fastuosa*, Linn., var. *alba*, Nees (N.O. Solanaceæ), an annual plant indigenous to India.

The seeds are auriform, 4 to 5 millimetres broad, and about 1 millimetre thick. They are thickened towards the curved margin, which is wavy, the edge exhibiting a triple ridge. They are yellowish-brown in colour, the testa being thick, and finely pitted. The hilum is prominent, and extends from the acute end of the seed to about the middle of the flattened edge. The seeds have a bitter taste, but no odour.

The chief constituent of the seeds is the alkaloid hyoscyne (scopolamine), but traces of hyoscyamine and atropine are also present. In addition, the seeds contain resin and a fixed oil.

Datura seeds are used in India as an equivalent of stramonium seeds. A tincture is prepared, which is a useful sedative against asthmatic coughs.

**DATURINA.****DATURINE.**

Daturine is a mixture of alkaloids obtained from *Datura Stramonium*, Linn. (N.O. Solanaceæ). It consists chiefly of hyoscyamine, with a variable proportion of atropine.

It occurs in white silky crystals. Only slightly soluble in water, but freely soluble in alcohol, ether, and chloroform.

Daturine has the same action as hyoscyamine, but is seldom given internally. For ophthalmic use it is prescribed in the form of ointment as a mydriatic. The alkaloid is dissolved in the ointment basis, usually soft paraffin melted at a low temperature. Daturine sulphate, which occurs in minute white crystals, is readily soluble in water, and is used in the form of drops (0·5 per cent. solution) for the eyes; it is also prepared in the form of ophthalmic discs, combined with gelatin.

*Dose.*— $\frac{1}{2}$  to 1 milligram ( $\frac{1}{120}$  to  $\frac{1}{60}$  grain).

**DECOCTA.****DECOCTIONS.**

Decoctions for which directions are not specifically given should be prepared by boiling 5 of the bruised drug with 120 of distilled water for ten minutes, then straining and, if necessary, making up the volume to 100 by passing distilled water through the strainer. All decoctions should be prepared in suitable covered vessels.

**DECOCTUM ACACIÆ CORTICIS.****DECOCTION OF ACACIA BARK.**

Acacia Bark, bruised	...	...	...	6·25
Distilled Water, sufficient to produce	...	...	...	100·00

Add the acacia bark to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of acacia bark is an astringent, and is official in India, the Australasian Colonies, and Eastern Colonies, where it is used instead of decoction of oak bark.

*Dose.*—15 to 60 mls ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM AGROPYRI.****DECOCTION OF COUCH GRASS.**

*Synonyms.*—Decoction Tritici; Decoction of Triticum.

Couch Grass, cut small	...	...	...	5·00
Distilled Water, sufficient to produce	...	...	...	100·00

Add the couch grass to 120 of the water, and proceed as in the case of Decoction Acaciæ Corticis.

Decoction of couch grass is demulcent, and a suitable vehicle for bladder sedatives and antiseptics. It is official in the Australasian Colonies, the Eastern Colonies, and the North American Colonies.

*Dose.*—15 to 60 mls ( $\frac{1}{2}$  to 2 fluid ounces).

### DECOCTUM ALOES COMPOSITUM.

COMPOUND DECOCTION OF ALOES.

*Synonym.*—Baume de Vie.

Extract of Barbados Aloes, in coarse powder	1·000
Myrrh, in coarse powder	0·50
Saffron	0·50
Potassium Carbonate	0·50
Extract of Liquorice	4·00
Compound Tincture of Cardamoms	30·00
Distilled Water, sufficient to produce...	100·00

Boil the myrrh, potassium carbonate, and extracts with 40 of distilled water for five minutes, add the saffron, and allow to cool; then add the tincture, and allow to stand for two hours in the covered vessel. Finally, strain through flannel, and pass sufficient distilled water through the strainer to make up the required volume.

This decoction is employed as a purgative, and is especially useful in amenorrhœa; it acts partly by causing pelvic congestion. The preparation loses its bitterness on keeping, owing to the action of the alkali, which forms a soap. Old preparations of aloes specifically excite the uterus after absorption; fresh preparations do not possess this property.

*Dose.*—15 to 60 mls ( $\frac{1}{2}$  to 2 fluid ounces).

### DECOCTUM ALTHÆÆ.

DECOCTION OF ALTHÆA.

*Synonym.*—Decoction of Marshmallow Root.

Althæa, sliced	5·00
Distilled Water, sufficient to produce	100·00

Add the althæa to 150 of the water, boil for fifteen minutes, strain, and make up the required volume, if necessary, by passing sufficient distilled water through the strainer.

This decoction is a popular remedy for coughs and bronchitis; it has valuable demulcent properties and is useful generally in catarrhs of the mucous surfaces.

*Dose.*—30 to 120 mls (1 to 4 fluid ounces).

### DECOCTUM ANTHEMIDIS ET PAPAVERIS.

DECOCTION OF CHAMOMILE AND POPPY.

Chamomile Flowers	10·00
Poppy Capsules, bruised	5·00
Distilled Water, sufficient to produce	100·00



Add the chamomile flowers and poppy capsules to 150 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

This decoction is used hot as an anodyne fomentation to abscesses.

### DECOCTUM CETRARIÆ.

#### DECOCTION OF ICELAND MOSS.

Iceland Moss, washed ... ..	5.00
Distilled Water, sufficient to produce ...	100.00

Add the washed lichen to 120 of the water, boil for ten minutes, strain with gentle pressure while hot, and make up the required volume, if necessary, by passing distilled water through the strainer.

This decoction was formerly official. It contains a large quantity of mucilage, and is demulcent and nutritive.

*Dose.*—30 to 120 mls (1 to 4 fluid ounces).

### DECOCTUM CHONDRI.

#### DECOCTION OF IRISH MOSS.

Irish Moss ... ..	2.50
Distilled Water, sufficient to produce ...	100.00

Wash the moss in cold water to free from impurities, then boil with 120 of the water for fifteen minutes, strain while hot, and make up the required volume, if necessary, by passing distilled water through the strainer.

This decoction is a demulcent and nutritive. It is used in coughs, bronchitis, and in catarrh of the bladder.

*Dose.*—30 to 120 mls (1 to 4 ounces), or more.

### DECOCTUM CINCHONÆ.

#### DECOCTION OF CINCHONA.

Red Cinchona Bark, in No. 20 powder ...	6.25
Distilled Water, sufficient to produce ...	100.00

Add the powdered bark to 100 of the water, boil for ten minutes, strain when cold to avoid subsequent deposition of cincho-tannic acid, which is soluble in hot water, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of cinchona was formerly official. It is a suitable vehicle for alkaline bitter tonics, and, on account of its astringency, is a useful addition to gargles.

*Dose.*—15 to 60 mls ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM CISSAMPELI.**

## DECOCTION OF CISSAMPELOS.

Cissampelos, thinly sliced	...	...	...	12.50
Distilled Water, sufficient to produce	...	...	...	100.00

Add the sliced drug to 120 of the water, boil for fifteen minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of cissampelos is official in India and the Eastern Colonies, where it is used as an equivalent of decoction of pareira.

*Dose.*—15 to 60 mls ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM CYDONII.**

## DECOCTION OF QUINCE SEEDS.

Quince Seed	...	...	...	1.25
Distilled Water, sufficient to produce	...	...	...	100.00

Add the quince seed to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of quince seed is a useful vehicle for eye lotions. On account of its mucilaginous character it is not so readily washed away by the tears. It is also used as an adjunct to skin lotions and creams.

**DECOCTUM GALLÆ.**

## DECOCTION OF GALLS.

Galls, bruised	...	...	...	6.25
Distilled Water, sufficient to produce	...	...	...	100.00

Add the bruised galls to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

It is used locally in the form of lotion to arrest hæmorrhage, and to lessen discharge from mucous membranes as in leucorrhœa.

**DECOCTUM GOSSYPII RADICIS CORTICIS.**

## DECOCTION OF COTTON ROOT BARK.

Cotton Root Bark, bruised	...	...	...	20.00
Distilled Water, sufficient to produce	...	...	...	100.00

Add the bruised bark to 200 of the water, boil until the liquid is reduced to 100, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of cotton root bark is official in India, the Eastern Colonies, the North American Colonies, and the West Indian Colonies, where it is used as a substitute for ergot, as an emmenagogue and to check hæmorrhage.

*Dose.*—15 to 60 mls ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM GRANATI CORTICIS.**

DECOCTION OF POMEGRANATE BARK.

Pomegranate Bark, in No. 10 powder	...	20'00
Distilled Water, sufficient to produce	...	100'00

Add the powdered bark to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

This decoction was formerly official. It is used as an astringent and as an anthelmintic to expel tape worm. Occasionally it gives rise to giddiness, colic, and diarrhœa.

*Dose.*—15 to 60 mils ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM HÆMATOXYLI.**

DECOCTION OF LOGWOOD.

Logwood, in chips	...	...	...	5'00
Cinnamon Bark, bruised	...	...	...	0'80
Distilled Water, sufficient to produce	...	...	...	100'00

Add the logwood to 120 of the water in a glass flask or earthenware vessel, boil for ten minutes, and add the cinnamon when the decoction is nearly ready; strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of logwood was formerly official. It is a mild astringent, used in diarrhœa and for other purposes when a mild astringent is desirable.

*Dose.*—15 to 60 mils ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM HORDEI.**

DECOCTION OF BARLEY.

*Synonym.*—Barley Water.

Pearl Barley, washed	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	100'00

Add the washed barley to 150 of the water, boil for twenty minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of barley was formerly official. Large quantities of it are taken in mucous catarrhs. It is used also as a diluent of cow's milk for the use of young infants, to prevent the formation of solid masses of casein in the stomach.

*Dose.*—30 to 120 mils (1 to 4 fluid ounces).

**DECOCTUM HYGROPHILÆ.**

DECOCTION OF HYGROPHILA.

Hygrophila, cut small	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	100'00

Add the drug to 300 of the water, boil until the liquid is reduced to



100, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of hygrophila is official in India and the Eastern Colonies, where it is used as a demulcent and diuretic, similar in its properties to decoction of couch grass.

*Dose.*—15 to 60 mils ( $\frac{1}{2}$  to 2 fluid ounces).

### DECOCTUM ISPAGHULÆ.

#### DECOCTION OF ISPAGHULA.

Ispaghula, bruised	...	...	...	1'37
Distilled Water, sufficient to produce	...	...	...	100'00

Add the bruised ispaghula to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of ispaghula is official in India and the Eastern Colonies, where it is used as a demulcent in diarrhœa. It may be taken unstrained, the seeds being swallowed with the mucilage. The action is similar to that of linseed.

*Dose.*—15 to 60 mils ( $\frac{1}{2}$  to 2 fluid ounces).

### DECOCTUM PAPAVERIS.

#### DECOCTION OF POPPY.

Poppy Capsules, bruised	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	100'00

Add the bruised capsules to 150 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of poppy was formerly official. It is a useful adjunct to astringent injections; it is also used as a fomentation to allay the pain of abscesses.

### DECOCTUM PAREIRÆ.

#### DECOCTION OF PAREIRA.

Pareira Root, in No. 20 powder	...	...	...	6'25
Distilled Water, sufficient to produce	...	...	...	100'00

Add the powdered root to 120 of the water, boil for fifteen minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of pareira should be strained hot; a preparation different in physical appearance is obtained if the decoction is allowed to cool before straining. It was formerly official, and is employed in catarrhal affections of the genito-urinary organs.

*Dose.*—15 to 60 mils ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM QUERCUS.**

## DECOCTION OF OAK BARK.

Oak Bark, bruised	...	...	...	6.25
Distilled Water, sufficient to produce	...	...	...	100.00

Add the bruised bark to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

This decoction was formerly official. It is an astringent, used principally as an injection in gonorrhœa and leucorrhœa, and as a gargle in relaxed sore throat.

*Dose.*—15 to 60 mils (1 to 2 fluid ounces).

**DECOCTUM SAPPAN.**

## DECOCTION OF SAPPAN.

Sappan, in chips	...	...	...	5.00
Cinnamon Bark, bruised	...	...	...	0.80
Distilled Water, sufficient to produce	...	...	...	100.00

Add the sappan to 120 of the water, boil for ten minutes, and add the cinnamon bark when the decoction is nearly ready; strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of sappan is used in India and the Eastern Colonies as an equivalent of decoction of logwood.

*Dose.*—15 to 60 mils ( $\frac{1}{2}$  to 2 fluid ounces).

**DECOCTUM SARSÆ COMPOSITUM.**

## COMPOUND DECOCTION OF SARSAPARILLA.

Sarsaparilla, cut transversely and bruised	...	...	...	12.50
Sassafras Root, in shavings	...	...	...	1.25
Guaiacum Wood, in shavings	...	...	...	1.25
Dried Liquorice Root, bruised	...	...	...	1.25
Mezereon Bark, cut small	...	...	...	0.625
Distilled Water, boiling, sufficient to produce	...	...	...	100.00

Add the drugs to 120 of the water, and allow to digest for one hour; then boil for ten minutes, cool, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Compound decoction of sarsaparilla was formerly official, and is chiefly useful as a vehicle for potassium iodide in syphilis, etc.

*Dose.*—60 to 300 mils (2 to 10 fluid ounces).

**NOTES.**—A simple decoction of sarsaparilla (*Decoction Sarsæ*), of the same strength as this preparation, was formerly official, and a concentrated compound decoction of sarsaparilla (1=8) is official as *Liquor Sarsæ Compositus Concentratus*. Zittmann's decoctions are prepared by digesting sarsaparilla with calomel, cinnabar, and various aromatics.

**DECOCTUM SCOPARII.**

## DECOCTION OF BROOM.

Broom Tops, dried	...	...	...	5.00
Distilled Water, sufficient to produce	...	...	...	100.00

Add the broom tops to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of broom was formerly official. It is chiefly employed as a diuretic in dropsical conditions.

*Dose*.—60 to 120 mls (2 to 4 fluid ounces).

### DECOCTUM TARAXACI.

DECOCTION OF TARAXACUM.

*Synonym*.—Decoction of Dandelion Root.

Taraxacum Root, dried, sliced, and bruised ... 5'00

Distilled Water, sufficient to produce ... 100'00

Add the taraxacum root to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of taraxacum was formerly official. It is used as a vehicle for bitter tonics.

*Dose*.—60 to 120 mls (2 to 4 fluid ounces).

### DECOCTUM ULMI.

DECOCTION OF ELM BARK.

Elm Bark, in small pieces ... 12'50

Distilled Water, sufficient to produce ... 100'00

Add the elm bark to 120 of the water, boil for ten minutes, strain, and make up the required volume, if necessary, by passing distilled water through the strainer.

Decoction of elm bark is used as a bitter and astringent.

*Dose*.—60 to 120 mls (2 to 4 fluid ounces).

### DIAMIDOPHENOL HYDROCHLORIDUM.

DIAMIDOPHENOL HYDROCHLORIDE.

$C_6H_{10}N_2OCl_2 = 197'00.$

Diamidophenol hydrochloride,  $C_6H_3(OH)(NH_2)_2, 2HCl$ , is prepared by the reduction of dinitro-phenol by means of tin and hydrochloric acid, and combination of the resulting diamido-phenol with hydrochloric acid.

It occurs as a greyish-white crystalline powder, readily soluble in water, slightly soluble in alcohol. It gives a yellow colour with ammonia, much more intense than that given with Nessler's reagent. Since the reaction is more delicate the salt has been recommended as a substitute for Nessler's reagent in the colorimetric determination of ammonia in waters, etc.

Diamidophenol hydrochloride is much used as a photographic developer, in conjunction with sodium sulphite. Unlike pyrogallol it can be used without alkali, and even in an acid state. Its solutions do not keep well and should be made as required.

NOTE.—This compound is also known under the trade-name Amidol.



**DIASTASUM.**

## DIASTASE.

*Synonyms.*—Amylase ; Maltine.

Diastase is an enzyme obtained by precipitation with alcohol from an infusion of malt prepared at a temperature not exceeding 60°. The diastase is purified by re-solution and reprecipitation.

It occurs as a whitish or yellowish, amorphous powder, or in translucent scales, odourless, tasteless, soluble in water, insoluble in alcohol. It is not precipitated by lime, lead acetate, or baryta. It has the power of converting starch into maltose, and its medicinal value depends on this property. The methods of assay may be summarised under two heads :—1. The determination by means of Fehling's solution of the maltose produced by the action of the enzyme on a known quantity of starch (see under *Extractum Malti*). 2. The time taken for the complete conversion of a known quantity of starch, the end of the reaction being indicated by the solution ceasing to give a reddish colour with iodine. The strength is expressed by the number of parts of starch converted by one part of diastase, but unless details of the method of assay be given, statements regarding the strength of commercial samples are of little value. Its activity is destroyed at high temperatures, and also in the presence of much acid.

Diastase may be mixed with starchy foods to assist their conversion into soluble sugar, or it may be taken towards the end of a meal mixed with a little milk, or in a cachet in amylaceous dyspepsia.

*Dose.*—6 to 30 centigrams (1 to 5 grains).

NOTE.—Taka-diastase is a ferment obtained from a fungus *Eurotium Oryzæ*, grown on cooked rice ; it is said to have the power of converting 100 times its weight of starch. *Dose*, 6 to 30 centigrams (1 to 5 grains).

**DIGITALIS FOLIA.**

## DIGITALIS LEAVES.

*Synonyms.*—Digitalis ; Foxglove Leaves.

Digitalis leaves are obtained from the foxglove, *Digitalis purpurea*, Linn. (N.O. Scrophularineæ), a biennial herb, widely distributed throughout Europe and common in England. The leaves should be collected when the plant is in full flower, and dried immediately after collection.

The leaves are from 10 to 30 centimetres in length, and may be as much as 12.5 to 15 centimetres in breadth, with a winged petiole of varying length, down which the lower lateral veins are usually decurrent. In shape the leaves are broadly ovate to lanceolate, the apex being blunt or sub-acute, the margin irregularly crenate or crenate-dentate. The upper surface is rugose, dull green in colour, and bears numerous short hairs ; the under surface is paler and very hairy ; the mid-rib is prominent, the lateral veins leaving it at a somewhat acute angle, and curving round towards the apex. Odour

faint, taste bitter. No well-defined characters are known by which the leaves of the second year's plant, which are alone official, can be distinguished from those of the first year, but the former usually contain a larger proportion of broadly ovate leaves than the latter. The separation is, however, not material, as the two appear to have identical therapeutical value. The epidermis of both surfaces consists of cells with thin wavy walls, is provided with small stomata, and numerous simple and glandular hairs. The simple hairs commonly consist of three to five (occasionally more) elongated cells with thin and often warty walls, the cells being frequently collapsed. The glandular hairs are short and provided with a unicellular or bicellular gland. The leaf contains no sclerenchymatous fibres or crystals of calcium oxalate.

The chief constituents of digitalis leaves are the glucosides digitoxin, digitalin, and possibly digitalein. Digitoxin is a well-defined crystalline substance, and is present to the extent of about 0.22 to 0.40 per cent., the average being 0.28 during August and September, after which the quantity rapidly diminishes. Digitalin has also been obtained in colourless acicular crystals, but the quantity present has not been determined. A glucoside, digitalein, has been obtained from foxglove seeds in the form of a white powder, soluble in water, but insoluble in chloroform and ether. It probably occurs also in the leaves. Commercial digitalein is a mixture containing digitoxin, digitalin, and true digitalein. A crystalline substance, digitophyllin, has also been discovered in the leaves, but its physiological action has not yet been determined. Digitonin,  $C_{27}H_{46}O_{14}$ , or  $C_{54}H_{92}O_{28}$ , is a glucoside (belonging to the class of saponins) present in the seeds and possibly also in the leaves. It occurs in colourless crystals. It dissolves with difficulty in water, but is much more soluble when mixed with digitalin, whose solubility it also increases, the aqueous solution frothing freely when shaken; readily soluble in alcohol, insoluble in ether and chloroform.

Digitalis increases the activity of all forms of muscle tissue, but more especially that of the heart and arterioles. The arterioles become constricted and blood-pressure in consequence rises. Upon the heart it exerts a double action; the diastole is prolonged on account of vagus stimulation, and the efficiency of systole is much increased, so that in spite of the slowing the output of blood per minute is augmented. Digitalis is employed in most forms of cardiac failure. It improves the nutrition of the heart by increasing the amount of blood forced through the coronaries, and also by prolonging diastole, *i.e.*, increasing the period of rest. It improves the circulation generally by sending more arterial blood from the left ventricle, so that in cases of venous congestion in cardiac failure it removes œdema and increases the urine. It is not, however, a diuretic to the normal individual. In Bright's disease it is generally inferior to strophanthus, because in this condition the blood-pressure

is already high, and digitalis by further constricting the vessels will make it higher. In specific fevers and other conditions in which cardiac failure may ensue, it should be given early, so that the drug may be acting when the danger threatens. In ordinary conditions it takes about twelve hours before its effect on heart muscle is appreciated. Digitalis is cumulative, and when given over a prolonged period should be employed with caution. The constant use of digitalis, by increasing the activity of the heart, leads to hypertrophy of that organ. Digitalis has also been employed in the treatment of internal hæmorrhage. It must not, however, be forgotten that in proportion as it constricts vessels, it raises blood-pressure.

Digitalin and digitalein possess the action on the heart peculiar to digitalis without being cumulative. Digitonin possesses none of these properties, but is poisonous. Digitoxin is cumulative in its action, and is the most poisonous of all the constituents of digitalis. Although digitoxin is the most active constituent of digitalis leaves, the relative activity of the drug cannot be determined by the chemical determination of this substance, since digitalin and possibly other bodies also contribute to the medicinal action of the leaves. Nor has the proposal to effect a valuation of the leaves by determining the quantity necessary to kill a certain weight of frog within a certain time been generally accepted as feasible. Hence it remains for the pharmacist to collect the leaves at the proper time, dry them thoroughly, and keep them perfectly dry, under which conditions they will retain their activity, whereas air-dry leaves rapidly become less efficacious. Powdered digitalis leaf is used in pill form as *Pilula Digitalis Composita*. Tincture of digitalis is in the commonest use. Infusion of digitalis is an active and reliable preparation preferred by many before the tincture. The glucosides of digitalis are more soluble in warm water in their natural state of combination than when separated from the leaves; the freshly prepared infusion contains the digitoxin and digitalin of the leaf. *Infusum Digitalis Concentratum* and *Succus Digitalis* are alternative liquid preparations. In cases of poisoning by digitalis, use the stomach-pump, apply mustard plasters, and give emetics; tannin, nitro-glycerin, morphine, alcoholic stimulants, or camphor.

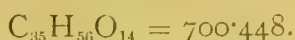
*Dose*.—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

NOTES.—Digitalis leaves and powder should be dried in a desiccator and kept in hermetically sealed vessels. The leaves may be of English or German origin. The proportion of digitoxin in these two varieties shows no appreciable difference. The leaves, especially those offered in the crushed or powdered state, are occasionally adulterated, leaves of the following plants being liable to be substituted or mistaken for the true drug:—Mullein leaves (*Verbascum thapsus*, Linn.), which are woolly, and have branched hairs; comfrey leaves (*Symphytum officinale*, Linn.), lanceolate, with isolated stiff hairs; primrose leaves, from *Primula vulgaris*, Huds., which are spatulate, and have straight lateral veins; ploughman's spikenard leaves (*Inula Conyza*, DC.), with an entire or dentate margin, the teeth bearing horny points. Matico leaves, from *Piper angustifolium*, Ruiz and Pav., are distinguished by the depressed veinlets on the upper surface.



**DIGITALINUM.**

DIGITALIN.

*Synonym.*—Digitalin Verum.

Digitalin,  $C_{35}H_{56}O_{14}$ , is a glucoside obtained from commercial German digitalin by extraction with ether-alcohol, purified by treatment with alcohol and animal charcoal.

It occurs as a white amorphous powder, or in characteristic granular masses. Very slightly soluble in cold water (1 in 1,000), chloroform, and ether, readily in alcohol. At  $217^{\circ}$  it melts and becomes yellow. With concentrated sulphuric acid it forms a golden-yellow solution which, on the addition of potassium hypobromite solution, changes to a magnificent rose-red or violet-red. With Keller's reaction a fiery carmine-red band appears; the lowermost layer of acetic acid is light yellow, changing to brownish. Sulphuric acid containing a little ferric oxide gives with a little digitalin at first an intense golden-yellow colour, and then a red solution; this colour rapidly changes to a beautiful and permanent reddish-violet. If too much digitalin is taken the red colour remains, and only the surface layer becomes violet. The glucoside may be split up into digitaligenin, digitalose, and dextrose.

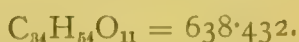
Digitalin has an action usually resembling that of the leaves. Some samples can be injected under the skin without causing inflammation, but their activity is so very variable that unless they have been previously standardised on animals, it is safer to avoid their use altogether. Solutions of digitalin rapidly lose their strength, and should be freshly prepared. Digitalin is best dispensed in pills prepared by trituration with sugar of milk and massing with glucose. In cases of poisoning by digitalin, use the stomach-pump, apply mustard plasters, and give emetics, tannin, nitro-glycerin, morphine, alcoholic stimulants, or camphor.

*Dose.*— $\frac{1}{4}$  milligram ( $\frac{1}{250}$  grain).

**NOTES.**—Digitalinum Germanicum (pulv.) consists chiefly of digitonin with a small proportion of true digitalin. It is a yellowish-white amorphous powder, soluble in water and alcohol, insoluble in ether and chloroform. It is the most suitable digitalin for hypodermic injection, causing little or no irritation. *Dose.*  $\frac{1}{2}$  to 2 milligrams ( $\frac{1}{250}$  to  $\frac{1}{32}$  grain). Homolle's digitalin is amorphous and readily soluble in chloroform. *Dose.* 1 to 2 milligrams ( $\frac{1}{65}$  to  $\frac{1}{32}$  grain).

**DIGITOXINUM.**

DIGITOXIN.



Digitoxin,  $C_{34}H_{54}O_{11}$ , is a glucoside obtained from digitalis leaves.

It occurs in colourless crystals, or as a white crystalline powder, odourless, and bitter, and may contain five molecules of water of crystallisation. The anhydrous substance contracts in bulk at

240°; the substance containing water melts at 145°. It is insoluble in hot or cold water, soluble in alcohol, chloroform, and ether. It gives a precipitate with tannic acid. If a little of the substance be dissolved in 3 or 4 mls of glacial acetic acid, a drop of dilute solution of ferric chloride added, and then concentrated sulphuric acid poured down so as to form a layer under the acetic acid solution, a dirty brownish-green band first appears, this quickly alters, so that the uppermost layer of the sulphuric acid is coloured brownish-red, while above this a broad, intense, bluish-green band appears, which soon changes to indigo-blue; after thirty-six to forty-eight hours a green colour again appears, which then, after a longer time, fades to a dirty brown (Keller's reaction). Heated on a water-bath for some time with concentrated hydrochloric acid, a green or brownish-green colour is obtained, which gives a cloudy greenish-yellow solution on diluting with water.

Digitoxin is the most powerful and reliable of the glucosides which have been extracted from digitalis leaves; owing to slow excretion it is cumulative in its action. As at present prepared, it varies greatly in activity according to the mode of preparation, but some makers have produced a fairly constant product. Digitoxin from an unknown source should not be tried on patients till its toxicity has been determined by experiments on animals. Digitoxin is the most important glucoside contained in digitalis leaves, and represents all its therapeutical action. It may be prepared in solution (1 in 1000), by using as a solvent 90 per cent. alcohol, 6 parts, adding glycerin, 3 parts, and water, 1 part. Pills may be prepared by careful trituration of the digitoxin with sugar of milk and massing with glycerin of tragacanth. Digitoxin is not considered suitable for hypodermic injection. In cases of poisoning by digitoxin use the stomach-pump, apply mustard plasters, and give emetics, tannin, nitroglycerin, morphine, alcoholic stimulants, or camphor.

*Dose.*— $\frac{1}{4}$  milligram ( $\frac{1}{250}$  grain).

*NOTE.*—"Digitaline cristallisé, Nativelle," consists chiefly of digitoxin.

## DUBOISINÆ SULPHAS.

### DUBOISINE SULPHATE.

Duboisine sulphate is a mixture of alkaloidal sulphates obtained from *Duboisia myoporoides*, R. Br. (N.O. Solanaceæ), and consists chiefly of hyoscyamine and hyoscyne.

It occurs as an amorphous, yellowish-white powder, or in granules, very hygroscopic. Soluble in water and alcohol.

Duboisine sulphate is a sedative, hypnotic, and mydriatic of variable strength. Its principal use is in ophthalmology. Drops for the eye contain 0.25 per cent. of the salt. Ophthalmic discs are prepared, containing  $\frac{1}{3000}$  grain in each, in combination with gelatin.

*Dose.*— $\frac{1}{2}$  to 2 milligrams ( $\frac{1}{20}$  to  $\frac{1}{30}$  grain).

**DULCAMARA.****DULCAMARA.***Synonym.*—Bittersweet.

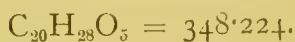
Dulcamara consists of the stems and branches of the *Solanum Dulcamara*, Linn. (N.O. Solanaceæ), a shrubby plant with long climbing stems, common in the hedges and thickets of England. The stems are gathered when the plants are about two or three years old. They are then cut into short pieces and dried.

The drug occurs in commerce in short cylindrical pieces about 6 millimetres in diameter. They are of a light green or brownish-yellow colour, glabrous, bear alternate scars, and are longitudinally furrowed and wrinkled. The outer layer is glossy and can easily be removed by scraping, disclosing a greenish cortex. The stems are usually hollow in the centre and the wood of old pieces exhibits annual rings. The odour is slight, the taste at first bitter, then sweet.

The chief constituent of dulcamara is the amorphous glucoside dulcamarin, to which the bitter-sweet taste is due. The drug also contains the glucosidal alkaloid solanine. Dulcamarin yields on hydrolysis dulcamaretin and sugar, whilst solanine yields solanidine and rhamnose.

Dulcamara was formerly a popular remedy for chronic rheumatism and for obstinate skin eruptions. A fresh infusion or decoction is made of a strength of 1 ounce of the herb to  $\frac{1}{2}$  pint of water, the dose being a wineglassful two or three times daily. An extract and a liquid extract (1 in 1) have been used abroad.

*Dose.*—2 to 4 mils (30 to 60 minims.) *of liq. mil. ext.*

**ELATERINUM.****ELATERIN.***Synonym.*—Momordicin.

Elaterin,  $\text{C}_{20}\text{H}_{28}\text{O}_5$ , is a neutral principle obtained from elaterium by boiling the latter with alcohol, precipitating the resulting solution by water, and purifying the precipitate of elaterin by washing with ether and recrystallising from absolute alcohol; or by extracting with chloroform, evaporating, washing the residue with ether, and recrystallising from alcohol or chloroform.

It occurs in the form of small hexagonal scales or prismatic crystals, or as a white crystalline powder; neutral, odourless, and having a slightly acrid, bitter taste. Insoluble in water, or glycerin; difficultly soluble in cold alcohol (1 in 160), benzol, or ether; easily soluble in chloroform, carbon bisulphide, amyl alcohol, and hot alcohol. It is soluble in solutions of alkalies and reprecipitated from these by excess of acid. On being heated it first becomes yellow, then melts at  $209^\circ$ , forming a yellow-brown liquid; and on complete ignition it burns without leaving any residue. Concentrated sulphuric acid



colours it yellow, gradually changing to scarlet; concentrated sulphuric acid with a trace of potassium bichromate produces an olive-green colouration, which gradually becomes darker. It is not precipitated from alcoholic solutions by tannic acid, mercuric chloride, or platinic chloride (absence of alkaloids).

Elaterin must be carefully distinguished from the drug elaterium. It is usually prescribed as Pulvis Elaterini Compositus, which is best given in a pill with extract of henbane. Elaterin is a most powerful hydragogue cathartic, and should be used with great caution, as its action is frequently followed by prostration.

*Dose.*—2 to 6 milligrams ( $\frac{1}{40}$  to  $\frac{1}{10}$  grain).

## ELATERIUM.

### ELATERIUM.

Elaterium is a dried sediment from the juice of the fruit of *Ecballium Elaterium*, A. Richard (N.O. Cucurbitaceæ), a prostrate trailing plant common in South Europe, and cultivated to a limited extent in England. The fruits are collected before they are quite ripe, sliced, and gently pressed; the juice is allowed to stand, and the deposit collected, drained, and dried.

The drug occurs in light, thin, friable, flat or slightly curved opaque pieces, about 2.5 millimetres thick, pale green in colour if fresh, becoming greyish-green on keeping. The fracture is short and granular, showing minute crystals when examined with a lens. The odour is slight, the taste bitter and acrid. The drug is sometimes adulterated with chalk or starch. When pure it does not effervesce with acids, nor give a blue colour on adding iodine to a cooled decoction. It should not yield more than 10 per cent. of ash.

The chief constituent of elaterium is the crystalline body, elaterin, of which it contains about 30 per cent. if of good quality, though the official minimum limit is fixed at 20 per cent. The drug also contains about 12 per cent. of water, 8 per cent. of mineral matter, and a crystalline bitter glucoside, prophetin. Elaterin does not exist as such in the plant, nor in the expressed juice of the fruit, but in the form of a glucoside which has been obtained as a very bitter amorphous powder; this glucoside yields elaterin as the result of decomposition caused by an enzyme. The elaterin formed is practically insoluble in water, and is deposited on standing, together with other substances suspended in the juice.

Elaterium, is a powerful hydragogue cathartic, and is usually prescribed in pills, which should be massed with milk sugar and syrup of glucose, and made to weigh 6 centigrams (1 grain) each. Sometimes elaterium is ordered in combination with other drugs, such as colocynth and hyoscyamus.

*Dose.*—6 to 30 milligrams ( $\frac{1}{10}$  to  $\frac{1}{2}$  grain).

*Notes.*—Elaterium imported from Malta is yellowish-grey in colour and contains less elaterin than the English variety. Since the active principle, elaterin, is official, it should be ordered instead of the crude product, elaterium, which is liable to considerable variation.

## ELEMI.

ELEMI.

*Synonym.*—Manilla Elemi.

Elemi is an oleoresin, obtained from *Canarium commune*, Linn. (N.O. Burseraceæ). It exudes naturally from the bark of the tree, but its flow is increased by incising the tree and applying heat. It is probably liquid when quite fresh, but gradually solidifies to a crystalline, honey-like mass, in which state it usually arrives in this country from Manilla.

When fresh, the oleoresin is pale yellow in colour, soft, granular, and opaque, somewhat resembling crystallised honey. On keeping it becomes firmer, yellower, and more transparent. When examined under the microscope it is found to contain numerous acicular crystals. It is entirely soluble in ether and alcohol, partly soluble in petroleum spirit. The odour is fragrant, recalling that of mace; the taste is pungent and bitter.

The chief constituents of Manilla elemi are volatile oil (10 to 30 per cent.), an amorphous resin named breïn (60 to 70 per cent.), and two isomeric crystalline resinous substances  $\alpha$ -amyrin and  $\beta$ -amyrin (about 25 per cent.), also a bitter principle, and three crystalline substances named elemic acid, bryoidin, and breïdin. Bryoidin is an acid, bitter substance, readily soluble in alcohol and crystallising from hot water; breïdin is a similar substance, but less soluble in water; breïn is readily soluble in cold alcohol; amyirin crystallises from hot alcohol in acicular crystals; elemic acid is soluble in alcohol and forms larger crystals than any of the other bodies. The specific gravity of the volatile oil is 0.87 to 0.91. It consists chiefly of d-phellandrene and dipentene, but also contains oxygenated substances and polyterpenes that have not yet been examined.

Elemi is used externally in the form of ointment as a local stimulant to ulcers and chronic skin diseases. Its properties are similar to those of turpentine, in which it is sometimes ordered to be dissolved before mixing with the ointment base.

NOTES.—The term elemi is applied to a variety of substances having certain physical properties in common. These varieties are named according to their geographical sources. Brazilian elemi is said to be obtained from *Icica Icariba*, DC.; Mexican, from *Amyris elemifera*, Linn. (?); Mauritius, from *Canarium Mauritianum*, Blume.

## ELIXIR ACETOMORPHINÆ ET TERPINI.

ELIXIR OF ACETOMORPHINE AND TERPIN.

Acetomorphine Hydrochloride	...	...	0.10
Terpin Hydrate	...	...	1.00
Alcohol	...	...	45.00
Glycerin	...	...	22.50
Syrup of Wild Cherry, sufficient to produce	...	...	100.00

Dissolve the acetomorphine hydrochloride and terpin hydrate in the alcohol, then add the glycerin and sufficient syrup of wild cherry to produce the required volume.

This elixir is a valuable sedative in chronic bronchitis and catarrhal affections of the mucous membrane.

*Dose*.—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

NOTES.—This preparation contains about  $\frac{1}{18}$  grain of acetomorphine hydrochloride, and  $\frac{5}{8}$  grain of terpin hydrate, in 1 fluid drachm. A similar preparation is known as Elixir Heroin cum Terpene.

## ELIXIR ADJUVANS.

### ADJUVANT ELIXIR.

Liquid Extract of Liquorice ... ..	12.00
Aromatic Elixir, sufficient to produce ...	100.00

Mix. Filter if necessary.

This preparation is a useful flavouring agent for mixtures in the proportion of 1 part to 8 to disguise the taste of cascara, ammonium chloride, and the alkaline iodides.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

NOTE.—This preparation corresponds to Elixir Adjuvans, U.S.P.

## ELIXIR ALETRIDIS.

### ELIXIR OF ALETRIS.

Liquid Extract of Aletris ... ..	25.00
Liquid Extract of Liquorice ... ..	6.00
Simple Elixir ... ..	45.00
Distilled Water, sufficient to produce ...	100.00

Mix the liquid extracts with the elixir, and add the distilled water.

Elixir of aletris is used as a uterine tonic.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## ELIXIR AMMONII BROMIDI.

### ELIXIR OF AMMONIUM BROMIDE.

Ammonium Bromide ... ..	10.00
Citric Acid ... ..	0.50
Aromatic Elixir, sufficient to produce ...	100.00

Dissolve the ammonium bromide and citric acid in 50 of aromatic elixir by agitation. Add sufficient aromatic elixir to make up the required volume. Filter if necessary.

This elixir is useful in whooping-cough, asthma, pharyngeal and laryngeal irritation, and the like.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).



**ELIXIR ANISI.**

## ELIXIR OF ANISE.

Anethol	...	...	...	...	...	0'35
Oil of Fennel	...	...	...	...	...	0'05
Spirit of Bitter Almond	...	...	...	...	...	1'25
Alcohol	...	...	...	...	...	24'00
Syrup	...	...	...	...	...	62'50
Magnesium Carbonate	...	...	...	...	...	1'50
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Mix the anethol, the oil, and the spirit of bitter almond with the alcohol, add the syrup and 12 of distilled water, and set aside for twelve hours. Then mix well with the magnesium carbonate and filter through a wetted filter, returning the first portions of the filtrate until it runs through clear; finally, add sufficient distilled water to make up the required volume.

This elixir is used as a carminative and flavouring agent.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**ELIXIR AROMATICUM.**

## AROMATIC ELIXIR.

Compound Spirit of Orange	...	...	...	...	2'50
Syrup	...	...	...	...	37'50
Purified Talc	...	...	...	...	3'00
Alcohol, a sufficient quantity.					
Distilled Water, sufficient to produce	...	...	...	...	100'00

Mix the compound spirit of orange with sufficient alcohol to make 25; then add the syrup in several portions, shaking well after each addition, and afterwards add, in the same manner, 37 of the water. Mix the purified talc intimately with the liquid, and then filter through a wetted filter, returning the first portions of the filtrate until a clear liquid is obtained. Lastly, wash the filter with a mixture of one of alcohol and three of distilled water, until the product measures 100.

This elixir is used as a flavouring agent, four mls (1 fluid drachm) being sufficient for 30 mls (1 fluid ounce) of mixture.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

NOTE.—This preparation corresponds to Elixir Aromaticum, U.S.P.

**ELIXIR AURANTII.**

## ELIXIR OF ORANGE.

Oil of Bitter Orange	...	...	...	...	0'30
Alcohol	...	...	...	...	30'00
Syrup	...	...	...	...	35'00
Cinnamon Water, sufficient to produce	...	...	...	...	100'00

Dissolve the oil of bitter orange in the alcohol and add the syrup and cinnamon water. Filter through paper moistened with alcohol (60 per cent.) and sprinkled with kaolin, refiltering if not bright.

Elixir of orange is a useful flavouring agent, 2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm) being sufficient for 30 mils (1 fluid ounce) of mixture.

*Dose.*—1 to 4 mils (15 to 60 minims).

*NOTE.*—This preparation corresponds to Elixir Simplex, of the British Pharmaceutical Conference Formulary, 1894.

### ELIXIR AURANTII COMPOSITUM.

#### COMPOUND ELIXIR OF ORANGE.

Tincture of Orange	...	...	...	...	10'00
Tincture of Lemon	...	...	...	...	2'50
Orange-flower Water	...	...	...	...	10'00
Alcohol	...	...	...	...	15'00
Syrup	...	...	...	...	40'00
Kaolin	...	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Mix the tinctures, orange-flower water, alcohol, syrup, and 20 of water with the kaolin. Set aside for twenty-four hours; then filter and wash the filter with sufficient water to make up the required volume.

This elixir is used as a flavouring agent, 2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm) being sufficient for 30 mils (1 fluid ounce) of mixture.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### ELIXIR BISMUTHI.

#### ELIXIR OF BISMUTH.

Bismuth and Ammonium Citrate	...	...	...	3'50
Distilled Water, hot	...	...	...	6'00
Solution of Ammonia, a sufficient quantity.				
Aromatic Elixir, sufficient to produce	...	...	...	100'00

Dissolve the bismuth and ammonium citrate in the hot water, and allow the solution to stand until any undissolved matter has subsided; decant the clear liquid, add to the residue just sufficient solution of ammonia to dissolve it, then add the decanted portion and sufficient aromatic elixir to make up the required volume. Filter if necessary.

Elixir of bismuth is a pleasantly flavoured substitute for Liquor Bismuthi.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR CASCARÆ.**

## ELIXIR OF CASCARA.

*Synonym.*—Aromatic Cascara.

Liquid Extract of Cascara Sagrada	...	...	34.50
Liquid Extract of Liquorice	...	...	34.50
Glycerin	...	...	29.00
Soluble Gluside	...	...	0.75
Oil of Anise	...	...	0.05
Oil of Peppermint	...	...	0.05
Oil of Cloves	...	...	0.025
Oil of Dill	...	...	0.025
Oil of Cinnamon	...	...	0.025
Alcohol, sufficient to produce	...	...	100.00

Dissolve the gluside in the liquid extracts and glycerin, previously mixed, and the oils in the alcohol; then mix the two solutions.

The nauseous taste of cascara is well disguised in this preparation, without impairment of its properties.

*Dose.*—2 mls (30 minims) for repeated administration; for a single administration, 4 to 8 mls (1 to 2 fluid drachms).

**ELIXIR CASCARÆ ET EUONYMINI.**

## ELIXIR OF CASCARA AND EUONYMIN.

Dry Extract of Euonymus	...	...	1.00
Tincture of Lemon	...	...	25.00
Tasteless Liquid Extract of Cascara	...	...	50.00
Glycerin, sufficient to produce	...	...	100.00

Add the dry extract of euonymus to the tincture of lemon; then add the tasteless liquid extract of cascara and the glycerin.

This elixir is an aperient and a reputed cholagogue.

*Dose.*—2 to 4 ~~milligrams~~ <sup>mils.</sup> ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR CINCHONÆ.**

## ELIXIR OF CINCHONA.

*Synonyms.*—Elixir Calisayæ; Elixir of Calisaya.

Tincture of Yellow Cinchona	...	...	15.00
Syrup	...	...	12.50
Glycerin	...	...	12.50
Aromatic Elixir, sufficient to produce	...	...	100.00

Mix, allow to stand, and filter through a wetted filter.

Elixir of cinchona is a pleasant bitter tonic.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).



**ELIXIR COCÆ.**

## ELIXIR OF COCA.

Miscible Liquid Extract of Coca	...	...	16·50
Simple Elixir, sufficient to produce	...	...	100·00

Mix.

This is a palatable preparation of coca for use as a cerebral stimulant and gastric sedative.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

**ELIXIR EUONYMI COMPOSITUM.**

## COMPOUND ELIXIR OF EUONYMUS.

Tincture of Euonymus	...	...	...	4·00
Iridin	...	...	...	0·20
Stronger Glycerin of Pepsin	...	...	...	12·50
Bismuth and Ammonium Citrate	...	...	...	3·50
Solution of Cochineal, a sufficient quantity.				
Simple Elixir, sufficient to produce	...	...	...	100·00

Mix the glycerin of pepsin with 10 of the simple elixir, and neutralise the mixture carefully with a weak solution of ammonia. Dissolve the bismuth and ammonium citrate in 50 of the simple elixir, aiding solution, if acid, by neutralising with ammonia. Macerate the iridin for twenty-four hours in the tincture of euonymus, and then filter. Mix the three solutions, add sufficient simple elixir to make up the required volume, colour with the solution of cochineal, and filter.

This is a digestive mixture and supposed cholagogue.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR EUONYMI ET PEPSINÆ.**

## ELIXIR OF EUONYMUS AND PEPSIN.

*Synonym.*—Liquor Euonymi cum Pepsino.

Tincture of Euonymus	...	...	...	12·50
Pepsin, in scales	...	...	...	2·75
Diluted Hydrochloric Acid	...	...	...	2·00
Glycerin	...	...	...	15·00
Distilled Water, sufficient to produce	...	...	...	100·00

Mix the acid with 50 of the water; then triturate the pepsin with the glycerin in a mortar and add gradually the acidified water, stirring constantly until the pepsin is dissolved. Next add the tincture, and, finally, sufficient distilled water to make up the required volume.

This elixir is a digestive adjuvant.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## ELIXIR FERRI ET QUININÆ ET STRYCHNINÆ PHOSPHATUM.

ELIXIR OF IRON, QUININE, AND STRYCHNINE PHOSPHATES.

*Synonyms.*—Easton's Elixir; Elixir of Phosphates.

Soluble Iron Phosphate	...	...	...	1·75
Quinine	...	...	...	0·875
Strychnine	...	...	...	0·0285
Concentrated Phosphoric Acid	...	...	...	0·25
Ammonium Carbonate...	...	...	...	0·90
Alcohol	...	...	...	6·25
Acetic Acid	...	...	...	2·75

Solution of Ammonia, a sufficient quantity.

Distilled Water, a sufficient quantity.

Aromatic Elixir, sufficient to produce ... 100·0

Dissolve the quinine and strychnine in the alcohol, add the phosphoric acid and 35 of aromatic elixir; then add a solution prepared by dissolving the ammonium carbonate in the acetic acid, neutralising the liquid with solution of ammonia, and adding sufficient distilled water to produce 5. Add to the mixture sufficient aromatic elixir to produce 88. Next, dissolve the iron phosphate in 3 of distilled water by the aid of gentle heat, neutralise, if necessary, with solution of ammonia, add sufficient aromatic elixir to produce 12, mix the product with the alkaloidal mixture, and filter if necessary.

This preparation has similar tonic properties to Easton's syrup.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds generally to Elixir Ferri Quininæ et Strychninæ Phosphatum, U.S.P., and contains exactly half as much strychnine ( $\frac{1}{84}$  grain in 1 fluid drachm) as Syrupus Ferri Phosphatis cum Quinina et Strychnina.

## ELIXIR FORMATUM.

ELIXIR OF FORMATES.

Sodium Formate	...	...	...	5·00
Potassium Formate	...	...	...	5·00
Simple Elixir, sufficient to produce	...	...	...	100·00

Dissolve the formates in 80 of the simple elixir, make up to the required volume, and filter if necessary.

This elixir is a pleasant form of administering the formates.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

## ELIXIR FORMATUM CUM STRYCHNINA.

ELIXIR OF FORMATES WITH STRYCHNINE.

Calcium Formate	...	...	...	6·00
Sodium Formate	...	...	...	3·00
Solution of Strychnine Hydrochloride	...	...	...	2·00
Simple Elixir, sufficient to produce	...	...	...	100·00

Dissolve the formates in 80 of the elixir, add the strychnine solution, make up the required volume with elixir, and filter if necessary.

This elixir is given as a muscular "tonic" and stimulant.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

**ELIXIR GLUSIDI.****ELIXIR OF GLUSIDE.**

*Synonyms.*—Elixir Saccharini; Elixir of Saccharin.

Gluside ... ..	5'00
Sodium Bicarbonate ... ..	3'00
Alcohol ... ..	12'50
Distilled Water, sufficient to produce ...	100'00

Dissolve the gluside and the sodium bicarbonate in 80 of distilled water, add the alcohol, filter, and wash the filter with sufficient distilled water to produce 100.

This elixir is used as a sweetening agent when syrups are undesirable, the addition of 1 per cent. to mixtures, etc., being usually sufficient.

*Dose.*—3 to 12 decimils (5 to 20 minims).

**ELIXIR GUARANÆ.****ELIXIR OF GUARANA.**

Guarana, in No. 60 powder ... ..	20'00
Light Magnesia ... ..	2'50
Oil of Cinnamon... ..	0'05
Syrup ... ..	10'00
Alcohol (60 per cent.), sufficient to produce ...	100'00

Macerate the mixed powders with 15 of the alcohol for twenty-four hours, mix with 40 of coarse sand, percolate with the alcohol until the percolate measures 80, then press the marc and collect the expressed liquid. To the percolate add the syrup and oil, and make up to 100 with the expressed liquid, previously reduced by evaporation if necessary.

Elixir of guarana is given mainly for "sick-headache."

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**ELIXIR IPECACUANHÆ.****ELIXIR OF IPECACUANHA.**

Liquid Extract of Ipecacuanha ... ..	5'00
Alcohol ... ..	5'00
Glycerin ... ..	25'00
Simple Elixir ... ..	5'00
Distilled Water, sufficient to produce ...	100'00

Mix, allow to stand for three days, and filter.

This preparation is of the same strength as Vinum Ipecacuanhæ.

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims), as an expectorant.

**ELIXIR KOLÆ.****ELIXIR OF KOLA.**

Liquid Extract of Kola... ..	10'00
Vanillin ... ..	0'10
Syrup, sufficient to produce ... ..	100'00

Dissolve the vanillin in the liquid extract and add the syrup.

Elixir of kola is a tonic and cerebral stimulant.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).



**ELIXIR PANCREATINI.****ELIXIR OF PANCREATIN.**

Pancreatin	...	...	...	...	5'00
Sodium Bicarbonate	...	...	...	...	3'00
Alcohol	...	...	...	...	15'00
Distilled Water	...	...	...	...	45'00
Aromatic Elixir, sufficient to produce...	...	...	...	...	100'00

Dissolve the pancreatin and sodium bicarbonate in the water, then add the alcohol and aromatic elixir.

Elixir of pancreatin assists digestion, but the ferment is destroyed in the stomach as soon as a sufficient quantity of acid is secreted.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR PAPAINI.****ELIXIR OF PAPAIN.**

Papain	...	...	...	...	5'00
Alcohol	...	...	...	...	15'00
Distilled Water...	...	...	...	...	45'00
Aromatic Elixir, sufficient to produce	...	...	...	...	100'00

Macerate the papain with the alcohol and water for several days, then filter, and add the aromatic elixir.

This elixir assists proteid digestion, and acts in both acid and alkaline media. It is given in cases of gastric ulcer and atonic dyspepsia.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm), with meals.

**ELIXIR PEPSINI.****ELIXIR OF PEPSIN.**

*Synonyms.*—Essentia Pepsini; Essence of Pepsin.

Pepsin	...	...	...	...	5'00
Alcohol	...	...	...	...	15'00
Distilled Water...	...	...	...	...	45'00
Aromatic Elixir, sufficient to produce	...	...	...	...	100'00

Macerate the pepsin with the alcohol and water for several days, then filter, and add the aromatic elixir.

Elixir of pepsin is given at the end of a meal, to assist digestion.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR PEPSINI ET BISMUTHI.****ELIXIR OF PEPSIN AND BISMUTH.**

*Synonym.*—Bismuth and Pepsin Mixture.

Stronger Glycerin of Pepsin	...	...	...	12'50
Bismuth and Ammonium Citrate	...	...	...	3'50
Alcohol (60 per cent.)	...	...	...	5'00
Simple Elixir, sufficient to produce	...	...	...	100'00

Mix the glycerin of pepsin with 10 of the simple elixir, and neutralise the mixture carefully with a weak solution of ammonia. Dissolve the bismuth and ammonium citrate in 50 of the simple elixir, aiding solution, if acid, by neutralising with ammonia. Finally, mix the two solutions, add the alcohol, make up the required volume with simple elixir, and filter.

This preparation is sedative to the gastric mucous membrane; it is employed as a digestive.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### ELIXIR PEPSINI ET BISMUTHI COMPOSITUM.

COMPOUND ELIXIR OF PEPSIN AND BISMUTH.

Stronger Glycerin of Pepsin	...	...	12.50
Bismuth and Ammonium Citrate	...	...	3.50
Morphine Acetate	...	...	0.10
Diluted Acetic Acid	...	...	0.20
Tincture of Nux Vomica	...	...	4.00
Diluted Hydrocyanic Acid	...	...	2.00
Alcohol (60 per cent.)	...	...	5.00
Solution of Cochineal, a sufficient quantity.			
Simple Elixir, sufficient to produce	...	...	100.00

Mix the glycerin of pepsin with 10 of the simple elixir, and neutralise the mixture carefully with a weak solution of ammonia. Dissolve the bismuth and ammonium citrate in 50 of the simple elixir, aiding solution, if acid, by neutralising with ammonia. Next mix the acetic acid, the alcohol, and 5 of the simple elixir, and dissolve the morphine acetate in the mixture. Mix the three solutions, add the tincture of nux vomica, then the hydrocyanic acid, and sufficient simple elixir to make up the required volume. Finally colour with the solution of cochineal, and filter.

This preparation is a gastric sedative and tonic digestive. It is useful in some forms of dyspepsia, vomiting, gastric ulceration, etc.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### ELIXIR PEPSINI ET BISMUTHI CUM FERRO.

ELIXIR OF PEPSIN AND BISMUTH WITH IRON.

Stronger Glycerin of Pepsin	...	...	12.50
Bismuth and Ammonium Citrate	...	...	3.50
Iron and Ammonium Citrate	...	...	3.50
Alcohol (60 per cent.)	...	...	5.00
Simple Elixir, sufficient to produce	...	...	100.00

Mix the glycerin of pepsin with 10 of the simple elixir, and neutralise the mixture carefully with a weak solution of ammonia. Dissolve the bismuth and ammonium citrate in 25 of the simple elixir, aiding solution, if acid, by neutralising with ammonia. Next dissolve

the iron and ammonium citrate in 25 of the simple elixir. Mix the first two solutions, then add the solution of iron and ammonium citrate, alcohol, and sufficient simple elixir to make up the required volume, and filter.

This preparation is a digestive tonic and sedative, and is especially useful in dyspepsia accompanied with anæmia.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### ELIXIR PEPSINI ET BISMUTHI CUM PODOPHYLLINO.

SOLUTION OF PEPSIN AND BISMUTH WITH PODOPHYLLIN.

Stronger Glycerin of Pepsin ...	...	...	12.50
Bismuth and Ammonium Citrate ...	...	...	3.50
Podophyllin Resin ...	...	...	0.25
Aromatic Spirit of Ammonia ...	...	...	5.00
Solution of Cochineal, a sufficient quantity.			

Simple Elixir, sufficient to produce ... 100.00

Mix the glycerin of pepsin with 10 of the simple elixir, and neutralise the mixture carefully with a weak solution of ammonia. Dissolve the bismuth and ammonium citrate in 25 of the simple elixir, aiding solution, if acid, by neutralising with ammonia. Next dissolve the podophyllin resin in the aromatic spirit of ammonia, and add this solution to 25 of the elixir. Mix the solutions, add sufficient simple elixir to make up the required volume, colour with the solution of cochineal, and filter.

This preparation is said to be of especial value in dyspepsia associated with liver congestion, but the efficiency of pepsin as a digestive is destroyed in alkaline mixtures.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### ELIXIR PEPSINI ET BISMUTHI CUM STRYCHNINA.

ELIXIR OF PEPSIN AND BISMUTH WITH STRYCHNINE.

Stronger Glycerin of Pepsin ...	...	...	12.50
Bismuth and Ammonium Citrate ...	...	...	3.50
Solution of Strychnine Hydrochloride ...	...	...	2.50
Alcohol (60 per cent.) ...	...	...	5.00
Simple Elixir, sufficient to produce ... 100.00			

Mix the glycerin of pepsin with 10 of the simple elixir, and neutralise the mixture carefully with a weak solution of ammonia. Dissolve the bismuth and ammonium citrate in 50 of the simple elixir, aiding solution, if acid, by neutralising with ammonia. Mix the two solutions with the solution of strychnine hydrochloride, add the alcohol, make up the required volume with simple elixir, and filter if necessary.

This preparation is used in atonic dyspepsia when iron is not required.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).



**ELIXIR PEPSINI ET BISMUTHI ET STRYCHNINÆ  
CUM FERRO.**

ELIXIR OF PEPSIN, BISMUTH, AND STRYCHNINE, WITH IRON.

Stronger Glycerin of Pepsin ...	...	...	12·50
Bismuth and Ammonium Citrate ...	...	...	3·50
Solution of Strychnine Hydrochloride ...	...	...	2·50
Iron and Ammonium Citrate ...	...	...	2·00
Alcohol (60 per cent.) ...	...	...	5·00
Simple Elixir, sufficient to produce ...	...	...	100·00

Mix the glycerin of pepsin with 10 of the simple elixir, and neutralise the mixture carefully with a weak solution of ammonia. Dissolve the bismuth and ammonium citrate in 25 of the simple elixir, aiding solution, if acid, by neutralising with ammonia. Next dissolve the iron and ammonium citrate in 25 of the simple elixir. Mix the first two solutions, then add the solution of iron and ammonium citrate, the solution of strychnine hydrochloride, alcohol, and sufficient simple elixir to make up the required volume, and filter.

This preparation is digestive and tonic in dyspepsia. It is often employed in neurasthenic conditions.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR PEPSINI ET QUININÆ.**

ELIXIR OF PEPSIN AND QUININE.

Stronger Glycerin of Pepsin ...	...	...	12·50
Quinine Acid Hydrochloride ...	...	...	1·00
Alcohol (60 per cent.) ...	...	...	5·00
Simple Elixir, sufficient to produce ...	...	...	100·00

Dissolve the quinine acid hydrochloride in 50 of the simple elixir, add the glycerin of pepsin, then add the alcohol and sufficient simple elixir to make up the required volume, and filter.

This preparation is a digestive tonic and bitter.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR PEPSINI ET QUININÆ CUM FERRO.**

ELIXIR OF PEPSIN AND QUININE, WITH IRON.

Stronger Glycerin of Pepsin ...	...	...	12·50
Iron and Quinine Citrate ...	...	...	3·50
Alcohol (60 per cent.) ...	...	...	5·00
Simple Elixir, sufficient to produce ...	...	...	100·00

Mix the glycerin of pepsin with 10 of the simple elixir, and dissolve the iron and quinine citrate in 50 of simple elixir. Mix the two solutions; then add the alcohol and sufficient simple elixir to make up the required volume.

This preparation is a digestive and bitter tonic. It is used in the dyspepsia of anæmia.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**ELIXIR PHOSPHORI.****ELIXIR OF PHOSPHORUS.**

*Synonyms.*—Syrupus Phosphori; Syrup of Phosphorus.

Compound Tincture of Phosphorus	...	...	20'00
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Glycerin	...	...	80'00
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Add the tincture to the glycerin and shake well.

This elixir should be made freshly as required. It is the best non-oily liquid form in which to administer free phosphorus. It should be dispensed undiluted, or mixed with glycerin, the patient being directed to add water to each dose.

*Dose.*—1 to 4 mls (15 to 60 minims).

*NOTES.*—This preparation contains  $\frac{1}{50}$  grain of phosphorus in 1 fluid drachm. The elixir should be stored in a cool and dark place, and dispensed in dark amber-coloured bottles.

**ELIXIR PHOSPHORI COMPOSITUM.****COMPOUND ELIXIR OF PHOSPHORUS.**

*Synonyms.*—Syrupus Phosphori Composita; Compound Syrup of Phosphorus.

Compound Tincture of Phosphorus	...	...	20'00
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Oil of Anise	...	...	0'20
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Glycerin	...	...	50'00
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Aromatic Elixir, sufficient to produce	...	100'00
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Place the tincture in a graduated bottle, add the oil and glycerin, and mix by repeatedly inverting the bottle. Then add the elixir in several portions, gently agitating after each addition until a clear liquid is obtained and the product measures 100.

This elixir should be prepared freshly as required. It is a nervine "tonic" and stimulant, and is best dispensed undiluted, the patient being directed to add water to each dose.

*Dose.*—1 to 4 mls (15 to 60 minims).

*NOTES.*—This preparation contains  $\frac{1}{50}$  grain of phosphorus in 1 fluid drachm. The elixir should be stored in a cool and dark place, and dispensed in dark amber-coloured bottles.

**ELIXIR PINI ET TERPINI ET ACETOMORPHINÆ.****ELIXIR OF PINE, TERPIN, AND ACETOMORPHINE.**

*Synonym.*—Linctus Pini et Terpini et Acetomorphinæ.

Oil of Pine	...	...	5'00
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Terpin Hydrate	...	...	0'50
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Acetomorphine Hydrochloride	...	...	0'05
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Alcohol	...	...	25'00
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Tincture of Saffron	...	...	3'00
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Glycerin	...	...	25'00
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Light Magnesium Carbonate	...	...	15'00
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Syrup, sufficient to produce	...	...	100'00
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Dissolve the terpin hydrate and acetomorphine hydrochloride in the alcohol, and mix the solution with the tincture of saffron and glycerin; then triturate the oil of pine with the magnesium carbonate, add the solution gradually, make up to the required volume with syrup, stir well, and filter.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

NOTES.—This preparation contains about  $\frac{5}{18}$  grain of terpin hydrate and  $\frac{1}{36}$  grain of acetomorphine hydrochloride in 1 fluid drachm. A similar preparation is known as Linctus Pini et Terpini et Heroin.

## ELIXIR QUININÆ AMMONIATUM.

### AMMONIATED ELIXIR OF QUININE.

Quinine Sulphate	...	...	...	...	1'00
Ammonium Carbonate	...	...	...	...	3'00
Alcohol	...	...	...	...	25'00
Solution of Carmine	...	...	...	...	0'25
Elixir of Orange	...	...	...	...	50'00
Distilled water, sufficient to produce	...	...	...	...	100'00

Dissolve the ammonium carbonate in 20 of distilled water, add the alcohol and quinine sulphate, and shake until solution is effected; then add the elixir of orange and solution of carmine, with sufficient distilled water to make up the required volume.

This elixir is a more palatable preparation than ammoniated tincture of quinine. It is a popular remedy for influenza and catarrh.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

## ELIXIR RHEI.

### ELIXIR OF RHUBARB.

*Synonyms.*—Liquor Rhei Dulcis; Sweet Essence of Rhubarb.

Rhubarb Root, in No. 12 powder	...	...	25'00
Fennel Fruit, bruised	...	...	10'00
Refined Sugar	...	...	20'00
Glycerin	...	...	15'00
Alcohol, a sufficient quantity.			
Distilled Water, sufficient to produce	...	...	100'00

Moisten the rhubarb and fennel with 75 of a mixture of 1 of alcohol and 3 of distilled water, macerate for forty-eight hours and express. Again macerate with sufficient of the menstruum to furnish, with the previous pressing, 75 of clear product. After twenty-four hours' maceration again express. Unite the liquors, allow to stand for two days, and filter into the sugar and glycerin.



Dissolve without heat, and add sufficient of the above menstruum to make up the required volume.

This preparation is an aperient especially for children's use.

*Dose*.—4 to 12 mls (1 to 3 fluid drachms).

### ELIXIR SENNÆ.

#### ELIXIR OF SENNA.

*Synonyms*.—Liquor Sennæ Dulcis; Sweet Essence of Senna.

Alexandrian Senna	...	...	...	...	66·00
Refined Sugar, in coarse powder	...	...	...	...	50·00
Chloroform	...	...	...	...	0·25
Oil of Coriander	...	...	...	...	0·03
Tincture of Capsicum	...	...	...	...	0·25

Alcohol, a sufficient quantity.

Distilled Water, a sufficient quantity.

Alcohol (60 per cent.), sufficient to produce ... 100·00

Macerate the senna for three days with a mixture of 16·5 of alcohol and 50 of water. Express forcibly, and pour the product on the sugar. Break up the marc, and again macerate with sufficient of the same menstruum to furnish in all 66 of product. Express again after twenty-four hours' maceration, add the liquor to that previously obtained and the sugar, heat to 94° in a closed vessel by means of a water-bath, and maintain at that temperature for ten minutes. When cold, strain and add, after mixing, the chloroform, oil of coriander, tincture of capsicum, and 1·5 of alcohol. Agitate thoroughly, and if necessary add sufficient 60 per cent. alcohol to make up the required volume.

This elixir is an active therapeutic preparation, and is much used as a laxative for children.

*Dose*.—4 to 12 mls (1 to 3 fluid drachms).

*NOTES*.—Elixir Sennæ Leguminorum is prepared in the same way as Elixir Sennæ, substituting senna legumes for the leaves. Elixir of senna pods is considered to be rather more active, and to gripe less, than the corresponding preparation of the leaves. *Dose*, 4 to 12 mls (1 to 3 fluid drachms).

### ELIXIR SIMPLEX.

#### SIMPLE ELIXIR.

Tincture of Orange	...	...	...	...	7·50
Syrup	...	...	...	...	40·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Mix the tincture with the syrup, add sufficient distilled water to make up the required volume, and filter through kaolin.

This preparation is used as a flavouring agent, from 1 to 4 mls (15 to 60 minims) being added to each 30 mls (1 fluid ounce) of a liquid medicine.

**ELIXIR TARAXACI COMPOSITUM.**

## COMPOUND ELIXIR OF TARAXACUM.

Liquid Extract of Taraxacum ...	...	...	3'50
Liquid Extract of Wild Cherry ...	...	...	2'00
Liquid Extract of Liquorice ...	...	...	6'00
Tincture of Sweet Orange Peel ...	...	...	6'00
Tincture of Cinnamon ...	...	...	3'50
Compound Tincture of Cardamoms ...	...	...	3'00
Aromatic Elixir, sufficient to produce ...	...	...	100'00

Mix, set aside for a few days, and then filter.

This elixir is a bitter stomachic and carminative.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**ELIXIR VALERIANÆ.**

## ELIXIR OF VALERIAN.

Liquid Extract of Valerian ...	...	...	15'00
Adjuvant Elixir sufficient to produce ...	...	...	100'00

Mix, and filter if necessary.

This elixir is an antispasmodic and stimulant, for use in hysteria and nervous affections.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**ELIXIR VIBURNI PRUNIFOLII.**

## ELIXIR OF VIBURNUM PRUNIFOLIUM.

Liquid Extract of Viburnum Prunifolium ...	...	...	12'50
Compound Tincture of Cardamoms ...	...	...	7'50
Aromatic Elixir, sufficient to produce ...	...	...	100'00

Mix, set aside for a few days, and then filter.

This elixir is given as a uterine sedative, to inhibit the uterine movements in early pregnancy. It is also employed in dysmenorrhœa.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**ELIXIR VIBURNI PRUNIFOLII COMPOSITUM.**

## COMPOUND ELIXIR OF VIBURNUM PRUNIFOLIUM.

Liquid Extract of Viburnum Prunifolium ...	...	...	50'00
Dry Extract of Hydrastis ...	...	...	1'75
Oil of Coriander ...	...	...	0'50
Oil of Caraway... ...	...	...	0'50
Glycerin, sufficient to produce ...	...	...	100'00

Dissolve the oils in the liquid extract, add the other ingredients, and filter if necessary.

This elixir acts in the same way of Elixir Viburni Prunifolii.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**EMBELIA.****EMBELIA.**

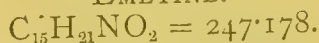
*Embelia* consists of the dried fruit of *Embelia ribes*, Burm. f., and of *E. robusta*, Roxb. (N.O. Myrsinæ); shrubs indigenous to India, the islands of the Indian Archipelago, and to East Africa.

The drug consists of spherical fruits about 4 millimetres in diameter. They vary in colour from red to nearly black. The fruits of *E. robusta* are finely striated longitudinally, those of *E. ribes* are warty. In both fruits a short stalk is often present, and a small five-partite calyx, and when these are removed they leave a small hole in the fruit. The pericarp is brittle, and encloses a reddish seed, which is covered with a thin membrane; on removing this the seed is seen to be covered with light spots, which disappear upon soaking in water. The seed is depressed at the base, and has a horny and slightly ruminated endosperm. The drug has a slightly astringent, aromatic taste.

The chief constituent of the drug is embelic acid,  $C_{18}H_{28}O_4$ ; this substance, which exists in the drug to the extent of about 2.5 per cent., is obtainable in golden-yellow lamellar crystals, melting at  $142^\circ$ . Embelic acid is insoluble in water, but soluble in alcohol, ether, chloroform, and benzene.

*Embelia* fruit is used in India and in the Eastern Colonies for its anthelmintic properties; it is especially useful for tape worm, one or two teaspoonfuls of the powdered fruit being given in milk on an empty stomach, and followed by a purgative.

*Dose*.—4 to 16 grammes (1 to 4 drachms).

**EMETINA.****EMETINE.**

Emetine or methyl-cephaeline,  $C_{13}H_{15}N(OCH_3)_2$ , is an alkaloid contained in ipecacuanha root.

It occurs as an amorphous white powder, with a bitter taste, darkening on exposure, and gradually assuming a yellow colour. Soluble in alcohol, ether, chloroform, benzene and fixed oils; slightly soluble in water, and hot petroleum ether; insoluble in essential oils and caustic alkaline solutions. Melting-point,  $69^\circ$ . It is strongly alkaline to litmus, and forms crystallisable salts with acids. Its insolubility in caustic alkalies distinguishes it from cephaeline.

Emetine hydrochloride,  $C_{15}H_{21}NO_2HCl \cdot 3H_2O$ , occurs as a white crystalline powder, readily soluble in water and alcohol. It is not affected by exposure to light. Emetine hydrobromide occurs in white crystals,  $C_{15}H_{21}NO_2HBr \cdot 2H_2O$ , soluble in water, but less so than the hydrochloride, difficultly soluble in absolute alcohol or chloroform. The dose of either salt is the same as that of the base.

Emetine has the expectorant action of ipecacuanha; it is, however, less powerfully emetic and but half as toxic as cephaeline. It may be given in solution in water or sherry, or it may be triturated with sugar of milk, and made into a pill. Emetine is probably not



so good a remedy as the crude preparations of ipecacuanha, since the pure alkaloids are more readily absorbed, whilst the effects of the drug on the alimentary canal are produced without absorption.

*Dose.*— $\frac{1}{2}$  to 2 milligrams ( $\frac{1}{100}$  to  $\frac{1}{30}$  grain).

### EMPLASTRUM ADHÆSIVUM ELASTICUM.

#### RUBBER ADHESIVE PLASTER.

Indiarubber, cut small and washed	...	...	2'00
Resin	...	...	4'00
Japan Wax	...	...	1'00
Benzoated Beef Tallow	...	...	8'00
Wool Fat	...	...	3'00
Sesame Oil, by weight	...	...	1'00
Methyl Salicylate, by weight	...	...	0'60
Thymol	...	...	0'40
Lead Oleate	...	...	80'00
Benzol, a sufficient quantity.			

Macerate the indiarubber in five times its weight of benzol until a quasi-solution is formed, mix this with the oil, and add the mixture to the resin, wax, tallow, and wool fat, previously melted together. Recover the benzol by distillation, strain the residue through several thicknesses of gauze, mix it with the melted lead oleate, and add the methyl salicylate and thymol.

This plaster should be spread on suitable sterile material, aseptic precautions being observed, and the spread plaster allowed to dry in a dust-free atmosphere. When dry, cover the plaster with sterile gauze, and pack it in sterile, air-tight containers.

*NOTE.*—An adhesive plaster (*Emplastrum Zinci Oleatis*) which can be subjected to fractional sterilisation may be prepared by melting 30 of wool fat and 8 of carnauba wax together, mixing with a solution of 12 of indiarubber in five times its weight of benzol, recovering the benzol by distillation, and adding a mixture of 40 of sifted zinc oleate with 10 by weight of glycerin. *Emplastrum Adhæsivum*, U.S.P., is prepared by mixing 2 of melted indiarubber with 2 of soft paraffin, and adding 96 of lead plaster.

### EMPLASTRUM AMMONIACI CUM HYDRARGYRO.

#### AMMONIACUM AND MERCURY PLASTER.

Ammoniacum	...	...	...	...	164'00
Mercury	...	...	...	...	41'00
Olive Oil	...	...	...	...	1'75
Sublimed Sulphur	...	...	...	...	0'25

Purify the ammoniacum by repeatedly boiling with water and passing the emulsions through a hair sieve, and evaporate the mixed liquids to a suitable consistence. Add the sulphur gradually to the previously heated oil and stir until uniformly blended, triturate the mercury with this mixture until a homogeneous mass is obtained, and add the purified ammoniacum.

This plaster is used to promote absorption in glandular enlargements; cut into strips, it is applied over and round the knee and other joints in chronic synovitis.

**EMPLASTRUM BELLADONNÆ.****BELLADONNA PLASTER.**

Liquid Extract of Belladonna	...	...	66·70
Resin Plaster, sufficient to produce	...	...	100·00

Concentrate the liquid extract by evaporation on a water-bath, until it weighs 16·5; then add the previously melted plaster and mix. This preparation contains about 0·5 per cent. of the alkaloids of belladonna root.

Belladonna plaster relieves pain and diminishes secretion; it is applied in intercostal neuralgia, lumbago, and to relieve the pain due to adhesions following pleurisy. Applied to the cardiac region it relieves pain and palpitation. Plasters of suitable shape applied to the breast arrest the secretion of milk. Cases of poisoning by absorption have arisen owing to the use of belladonna plaster over too large a surface.

NOTE.—Emplastrum Belladonnæ, U.S.P., is prepared by mixing 30 of Extractum Belladonnæ Foliorum with 70 of Emplastrum Adhæsivum, and should contain from 0·38 to 0·42 per cent. of mydriatic alkaloids.

**EMPLASTRUM BELLADONNÆ MITIUS.****MILDER BELLADONNA PLASTER.**

Liquid Extract of Belladonna	...	...	33·35
Resin Plaster, sufficient to produce	...	...	100·00

Concentrate the liquid extract by evaporation on a water-bath, until it weighs 10; then add the previously melted residue, and mix.

This plaster contains about 0·25 per cent. of the alkaloid of belladonna root, and is less likely to produce poisonous symptoms than Emplastrum Belladonnæ.

NOTE.—If this plaster be desired of a bright green colour, chlorophyll may be added in sufficient quantity.

**EMPLASTRUM BELLADONNÆ VIRIDE.****GREEN BELLADONNA PLASTER.**

Green Extract of Belladonna	...	...	25·00
Alcohol	...	...	100·00
Distilled Water, hot, a sufficient quantity			
Resin Plaster, sufficient to produce	...	...	100·00

Mix the green extract of belladonna with sufficient of the hot water to make a thin paste, add 50 of alcohol, and allow the mixture to stand until clear. Decant the clear liquid and repeat the treatment with alcohol; then distil off the alcohol and mix the residue with sufficient resin plaster to produce the required weight.

This plaster contains about 0·25 per cent. of the alkaloids of belladonna leaf, and is therefore only half the alkaloidal strength of Emplastrum Belladonnæ.

NOTE.—Commercial belladonna plaster is frequently made with a rubber basis, like Emplastrum Adhæsivum Elasticum, and its bright green colour is sometimes due to the presence of added chlorophyll.

**EMPLASTRUM CALEFACIENS.**

## WARMING PLASTER.

Cantharides, in coarse powder ...	...	...	4'00
Yellow Beeswax...	...	...	4'00
Resin ...	...	...	4'00
Resin Plaster ...	...	...	52'00
Soap Plaster ...	...	...	32'00
Distilled Water, boiling...	...	...	20'00

Pour the water over the cantharides and set aside for six hours, then squeeze strongly through calico and reduce the volume to one-third by evaporation on a water-bath; add the other ingredients, melt, and stir together until well mixed.

This plaster is a mild counter-irritant; used to remove pain in rheumatic joints, and where a rubefacient as opposed to a vesicant action is required.

NOTE.—The following modified form of the above preparation has been suggested as yielding a more uniform product:—Dissolve 0·02 of cantharidin, by the aid of heat, in as small a quantity of chloroform as possible; then add 4·5 of olive oil. Next add the mixture to 95 of resin plaster, previously melted on a water-bath and stir well, continuing the application of heat until the chloroform is dissipated. The product should weigh about 100.

**EMPLASTRUM CALEFACIENS MYLABRIDIS.**

## WARMING PLASTER OF MYLABRIS.

Mylabris, in coarse powder ...	...	...	4'00
Yellow Beeswax ...	...	...	4'00
Resin ...	...	...	4'00
Resin Plaster ...	...	...	52'00
Soap Plaster ...	...	...	32'00
Distilled Water, boiling ...	...	...	20'00

Proceed as in the case of Emplastrum Calefaciens. The proportion of resin and of yellow beeswax may be altered to meet the exigencies of climate.

This plaster is used in India, the African Colonies, and the Eastern Colonies, as a substitute for Emplastrum Calefaciens.

**EMPLASTRUM CANTHARIDINI.**

## CANTHARIDIN PLASTER.

Cantharidin ...	...	...	0'10
Yellow Beeswax ...	...	...	33'00
Prepared Suet ...	...	...	33'00
Chloroform, a sufficient quantity.			
Resin, sufficient to produce ...	...	...	100'00

Dissolve the cantharidin, by the aid of heat, in as small a quantity of chloroform as possible; then add the other ingredients, previously melted together on a water-bath, and stir well. Heat until the chloroform is dissipated, and stir till cold.

This plaster is more suitable for blistering purposes than cantharides plaster, as it is more certain in its action.



NOTE.—Emplastrum Cantharidini Elasticum is prepared by adding a mixture of 5 by weight of sesame oil and 15 of wool fat to the chloroformic solution of cantharidin, and incorporating the mixture with 10 of indiarubber, 20 of resin, 43·9 of benzoated beef tallow, and 5 of Japan wax, as directed in the case of Emplastrum Adhæsivum Elasticum. Finally add 0·6 by weight of methyl salicylate and 0·4 of thymol.

## EMPLASTRUM CANTHARIDIS.

### CANTHARIDES PLASTER.

Cantharides, in powder ...	...	...	...	35·00
Yellow Beeswax ...	...	...	...	20·00
Lard ...	...	...	...	20·00
Resin ...	...	...	...	20·00
Soap Plaster ...	...	...	...	5·00

Mix the soap plaster with the previously melted resin, add the beeswax and lard, sprinkle the cantharides into the melted mixture, and stir until cold.

Cantharides plaster is usually spread on calico adhesive plaster with a half-inch margin, for blistering purposes. Blisters are used principally to relieve deep-seated pain. They act (1) *Locally*, causing congestion of the surrounding parts, (2) *Generally*, exciting the medulla reflexly, and so causing vaso-constriction, a rise in blood pressure, and stimulation of respiration, (3) *Specifically*, influencing the metabolism of some internal organ, the nerves to which proceed from the same segment of the cord as that supplying the blistered area of skin.

## EMPLASTRUM CAPSICI.

### CAPSICUM PLASTER.

Liquid Extract of Capsicum ...	...	...	10·00
Resin Plaster, sufficient to produce ...	...	...	100·00

Evaporate the spirit from the extract over a water-bath, then stir into the melted resin plaster.

Capsicum plaster is a rubefacient and mild counter-irritant used for rheumatism and lumbago.

NOTES.—When freshly made this plaster is of a bright orange colour, but it loses colour on keeping. Emplastrum Capsici Elasticum is prepared by evaporating the liquid extract to remove the alcohol, and proceeding as in the case of Emplastrum Cantharidini Elasticum, but using only 39 of benzoated beef tallow. Emplastrum Capsici, U.S.P., is prepared by mixing 25 centigrams of Oleoresina Capsici with sufficient Emplastrum Adhæsivum to cover an area 15 centimetres square.

## EMPLASTRUM FERRI.

### CHALYBEATE PLASTER.

*Synonyms.*—Emplastrum Roborans; Strengthening Plaster.

Peroxide of Iron, in fine powder ...	...	...	9·00
Burgundy Pitch ...	...	...	18·00
Lead Plaster ...	...	...	73·00

Melt the Burgundy pitch and lead plaster together, add the

peroxide of iron, and stir the mixture constantly till it stiffens on cooling.

Chalybeate plaster is used mainly to give warmth and support. It is applied, for example, to the loins to relieve pain and weakness, and also for lumbago and rheumatism.

NOTE.—Emplastrum Ferri was official in the British Pharmacopœia, 1885.

### EMPLASTRUM GALBANI.

#### GALBANUM PLASTER.

Galbanum	...	...	...	...	9'00
Ammoniacum	...	...	...	...	9'00
Yellow Beeswax...	...	...	...	...	9'00
Lead Plaster	...	...	...	...	73'00

Melt the galbanum and ammoniacum together; then add the beeswax and lead plaster, previously melted together, and mix.

Galbanum plaster is a mild irritant and a favourite application to inflamed joints to reduce swelling.

NOTE.—Emplastrum Galbani was official in the British Pharmacopœia, 1885.

### EMPLASTRUM HYDRARGYRI.

#### MERCURIAL PLASTER.

Mercury	...	...	...	...	32'80
Olive Oil	...	...	...	...	1'40
Sublimed Sulphur	...	...	...	...	0'20
Lead Plaster	...	...	...	...	65'60

Gradually add the sulphur to the previously heated oil and stir until uniformly blended; triturate the mercury with this mixture until metallic globules can no longer be seen, then add the previously melted lead plaster and mix.

Mercury plaster is used to promote absorption of glandular enlargements; it is also used in chronic synovitis, and in some forms of skin disease. Enough mercury is absorbed to paralyse the leucocytes locally, and so inflammation is hindered.

NOTE.—Emplastrum Hydrargyri, U.S.P., is prepared by mixing 30 of mercury with 1 of oleate of mercury, 10 of hydrous wool fat, and 59 of lead plaster.

### EMPLASTRUM MENTHOLIS.

#### MENTHOL PLASTER.

*Synonym.*—Emplastrum Menthol.

Menthol	...	...	...	...	15'00
Yellow Beeswax	...	...	...	...	10'00
Resin	...	...	...	...	75'00

Melt together the beeswax and resin, and dissolve the menthol in the mixture at a temperature between 71° and 77°.

Menthol plaster is used in neuralgia, rheumatism, and lumbago.

**EMPLASTRUM MYLABRIDIS.**

## MYLABRIS PLASTER.

Mylabris, in powder	...	...	...	...	35'00
Yellow Beeswax	...	...	...	...	20'00
Lard, or Prepared Suet	...	...	...	...	20'00
Resin	...	...	...	...	20'00
Soap Plaster	...	...	...	...	5'00

Proceed as in the case of Emplastrum Cantharidis.

Mylabris plaster is official in India, the African Colonies, and the Eastern Colonies, as a substitute for cantharides plaster.

**EMPLASTRUM OPII.**

## OPIUM PLASTER.

Opium, in very fine powder	...	...	...	...	10'00
Resin Plaster	...	...	...	...	90'00

Melt the plaster on a water-bath ; gradually stir in the opium.

Opium plaster is used to relieve local pain in rheumatism, neuralgia, and sciatica. In reality, however, neither opium nor morphine has any peripheral effect on sensory nerve-endings, and can only act after absorption by their effect on the brain.

NOTE.—Emplastrum Opii, U.S.P., contains 6 per cent. of extract of opium, and is made with indiarubber adhesive plaster.

**EMPLASTRUM PICIS.**

## PITCH PLASTER.

*Synonym.*—Poor Man's Plaster.

Burgundy Pitch	...	...	...	...	52'00
Frankincense	...	...	...	...	26'00
Resin	...	...	...	...	9'00
Yellow Beeswax	...	...	...	...	9'00
Olive Oil...	...	...	...	...	4'00
Distilled Water	...	...	...	...	4'00

Melt together the frankincense, beeswax, pitch, and resin ; add the oil and water, and, with constant stirring, evaporate to a suitable consistence.

Pitch plaster is a mild counter-irritant. It is applied to the chest in chronic bronchitis, to the joints in chronic rheumatism, and to the loins in lumbago.

**EMPLASTRUM PLUMBI.**

## LEAD PLASTER.

Lead Oxide	...	...	...	...	25'00
Olive Oil	...	...	...	...	50'00
Distilled Water	...	...	...	... about	25'00

Place together in a suitable vessel on a steam bath ; boil gently, and keep simmering for four or five hours, constantly stirring until a proper consistence is acquired ; if necessary, add more water during the operation,



Lead plaster, spread on calico, is used to draw together the edges of wounds, and as a protective agent. Spread on chamois leather, it affords greater protection, and is used for corns, bunions, and abraided surfaces.

NOTE.—*Emplastrum Plumbi*, U.S.P., is prepared by dissolving 100 of hard soap in 350 of hot water, straining the solution, and adding 60 of lead acetate, previously dissolved in 250 of hot water, the precipitated mass being subsequently well washed and kneaded.

### EMPLASTRUM PLUMBI IODIDI.

#### LEAD IODIDE PLASTER.

Lead Iodide	...	...	...	...	...	10'00
Lead Plaster	...	...	...	...	...	80'00
Resin	...	...	...	...	...	10'00

Melt together the plaster and resin, using as little heat as possible ; add the lead iodide, previously finely powdered.

Lead iodide plaster is applied to joints in chronic enlargements and to swollen glands as a mild counter-irritant.

### EMPLASTRUM RESINÆ.

#### RESIN PLASTER.

*Synonym.*—Adhesive Plaster.

Resin	...	...	...	...	...	10'00
Lead Plaster	...	...	...	...	...	80'00
Hard Soap	...	...	...	...	...	5'00

Melt separately, using as little heat as possible, then mix.

Resin plaster is used in minor surgery to draw together the edges of wounds, to apply dressings and as a protective. For these purposes a thin backing of calico is usually preferred. For greater protection the plaster may be spread on chamois leather, and for strength and support on brown holland or moleskin.

### EMPLASTRUM SAPONIS.

#### SOAP PLASTER.

Hard Soap	...	...	...	...	...	15'00
Lead Plaster	...	...	...	...	...	90'00
Resin	...	...	...	...	...	2'50

Mix the soap, plaster, and resin, having previously melted them separately at a low temperature, and evaporate with constant stirring to a suitable consistence.

Soap plaster is used as a protection for corns and bunions and in place of resin plaster where the latter is too adhesive.

NOTES.—*Emplastrum Saponis Fuscum*, B.P. 1885, was prepared by boiling 73½ of malt vinegar with 7 of lead oxide on a steam-bath, stirring constantly till combined, then adding 4½ of curd soap, boiling until most of the liquid had evaporated, adding a mixture of 5½ of yellow beeswax and 9 of olive oil, and stirring until a homogeneous mixture was obtained. *Emplastrum Saponis*, U.S.P., is prepared by mixing 10 of hard soap with sufficient water to produce a semi-liquid, then adding 90 of melted lead plaster, mixing, and evaporating.

**EMPLASTRUM ZINCI OXIDI.****ZINC OXIDE PLASTER.**

Zinc Oxide, in fine powder	...	...	...	20'00
Indiarubber, cut small and washed	...	...	...	8'00
Resin	...	...	...	15'00
Japan Wax	...	...	...	4'00
Benzoated Beef Tallow	...	...	...	25'00
Wool Fat	...	...	...	15'00
Methyl Salicylate, by weight	...	...	...	0'60
Thymol	...	...	...	0'40
Glycerin, by weight	...	...	...	12'00

Sift the zinc oxide, make it into a paste with the glycerin, and add this to the mixture of indiarubber, resin, wax, tallow, and wool fat, prepared as described in the case of Emplastrum Adhæsivum Elasticum. Finally, add the methyl salicylate and thymol.

**EMULSIO CHLOROFORMI.****EMULSION OF CHLOROFORM.**

Chloroform	...	...	...	...	5'00
Tincture of Quillaia	...	...	...	...	2'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Mix, by shaking vigorously.

This preparation is of the same strength as spirit of chloroform, which it may replace as a flavouring agent, and as a preservative addition to mixtures, etc. Most mixtures containing vegetable extracts, infusions, or tinctures are liable to become mouldy if kept under ordinary conditions longer than about seven days. Such mixtures may be preserved by the addition of 2 to 3 per cent. of chloroform emulsion. If chloroform disagrees, or is otherwise objectionable, 0·05 to 0·1 per cent. of benzoic or salicylic acid is usually effectual in preserving mixtures.

*Dose.*—3 to 25 decimils (5 to 40 minims).

*NOTE.*—Emulsum Chloroformi, U.S.P., is prepared as follows:—Add 4 of chloroform to 1 of powdered tragacanth in a perfectly dry bottle, and thoroughly shake so that every part of the surface may be wetted, then add about 25 of distilled water, and again shake well; next add 6 of oil of almonds in several portions, shaking after each addition, and, when thoroughly emulsified, make up to 100 with water, added gradually and with shaking.

**EMULSIO IODOFORMI.****EMULSION OF IODOFORM.**

Iodoform, in fine powder	...	...	...	10'00
Glycerin	...	...	...	70'00
Distilled Water	...	...	...	20'00

Rub the iodoform to a smooth paste with the glycerin, and add the distilled water.

Iodoform emulsion is used for injection into sinuses, and, mixed with 40 parts of warm water as a bladder antiseptic. When the presence of a large proportion of glycerin is a disadvantage, owing to irritation or to the tendency of the glycerin to abstract water from the surrounding tissue and cause pressure by increase of bulk, *Emulsio Iodoformi sine Glycerino* is preferred.

### EMULSIO IODOFORMI SINE GLYCERINO.

EMULSION OF IODOFORM WITHOUT GLYCERIN.

Iodoform, in fine powder	...	...	...	10·00
Alcohol	...	...	...	2·00
Tragacanth, in powder	...	...	...	1·00
Distilled Water, sufficient to produce	...	...	...	100·00

Rub the iodoform to a smooth paste with a mucilage prepared by mixing the tragacanth with the alcohol and water.

This emulsion is diluted with forty times its volume of warm water for use in cases of ulcerated or irritable bladder, and for injection into other closed cavities.

### EMULSIO MAGNESIÆ.

EMULSION OF MAGNESIA.

*Synonym.*—*Lac Magnesiae*; *Magnesia Milk*.

Magnesium Sulphate	...	...	...	12·50
Solution of Potassium Hydroxide	...	...	...	114·00
Distilled Water, a sufficient quantity.				

Dissolve the magnesium sulphate in 200 of distilled water; then mix the solution of potassium hydroxide with 100 of distilled water, and pour the liquid in a thin stream into the magnesium sulphate solution, with constant stirring. Allow the precipitate to settle, pour off the clear liquid, wash the precipitate with distilled water until the washings are free from saline taste, then transfer the precipitate to a muslin strainer, allow it to drain without pressing, and diffuse it in sufficient distilled water to produce 100 by volume. The product should contain about 13 grains of magnesium hydroxide in each fluid ounce.

This preparation is a valuable antacid and corrective for use in cases where magnesium carbonate causes flatulence. It is also employed as a mouth-wash to neutralise the acids arising from fermentation round the teeth, the teeth and gums being brushed with the undiluted liquid at bedtime.

*Dose.*—4 to 16 mils (1 to 4 fluid drachms).

*NOTES.*—A more concentrated preparation (*Magma Magnesiae* or *Cremor Magnesiae*) may be prepared by doubling the proportion of magnesium sulphate; the resulting magnesia cream will contain nearly 26 grains of magnesium hydroxide in each ounce, and serves as a useful antidote in cases of poisoning by mineral acids.



**EMULSIO MORRHUÆ PANCREATICA.****PANCREATISED EMULSION OF COD-LIVER OIL.***Synonym.*—Cod-liver Oil with Pancreatin.

Glycerin of Pancreatin	...	...	...	2.50
Stronger Glycerin of Pepsin	...	...	...	2.50
Cod-liver Oil	...	...	...	40.00
Gluside	...	...	...	0.025
Solution of Potassium Hydroxide	...	...	...	1.00
Tragacanth, in powder	...	...	...	2.00
Gum Acacia, in powder	...	...	...	8.00
Oil of Cassia	...	...	...	0.075
Oil of Bitter Almonds	...	...	...	0.075
Distilled Water, sufficient to produce	...	...	...	100.00

Thoroughly mix the gums and oils in a dry mortar. Dissolve the gluside in the solution of potassium hydroxide, make up to 32 with distilled water, and add the glycerins of pancreatin and pepsin. Add the second mixture to the first in a mortar, stir continuously until emulsified, and gradually incorporate sufficient distilled water to produce 100 by volume.

This preparation contains 40 per cent. of cod-liver oil in an easily assimilable form. It is free from sugar and therefore suitable for diabetic patients.

*Dose.*—8 to 30 mils ( $\frac{1}{4}$  to 1 fluid ounce).

*NOTE.*—Cremor Morrhue Pancreaticus should be used if a pancreatised emulsion of cod-liver oil with Irish moss be required.

**EMULSIO MORRHUÆ PANCREATICA CUM BYNO.****PANCREATISED EMULSION OF COD-LIVER OIL WITH MALT.***Synonym.*—Cod-liver Oil with Pancreatin and Malt.

Glycerin of Pancreatin	...	...	...	9.00
Cod-liver Oil	...	...	...	40.00
Gum Acacia, in powder	...	...	...	2.00
Tragacanth, in powder	...	...	...	0.25
Saccharated Solution of Lime	...	...	...	2.00
Extract of Malt, sufficient to produce	...	...	...	100.00

Mix the gums with the glycerin of pancreatin in a large mortar, and add 10 by volume of extract of malt. Mix the solution of lime with the cod-liver oil, take the same quantity of this mixture as the extract, mix thoroughly in a warm mortar, and add the remaining extract of malt and oil alternately, in small portions, until the whole has been mixed and the product measures 100.

This emulsion contains 40 per cent. of cod-liver oil, and the addition of extract of malt renders it a highly nutritive preparation.

*Dose.*—8 to 30 mils ( $\frac{1}{4}$  to 1 fluid ounce).

**EMULSIO OLEI MORRHUÆ.**

EMULSION OF COD-LIVER OIL.

Cod-liver Oil	...	...	...	...	50·00
Gum Acacia, in fine powder	...	...	...	...	12·50
Syrup	...	...	...	...	6·25
Oil of Bitter Almonds	...	...	...	...	0·10
Distilled Water, sufficient to produce	...	...	...	...	100·00

Triturate the cod-liver oil with the gum, add 25 of water, stir briskly till emulsified; then add the oil of bitter almonds, syrup, and sufficient water to produce 100 by volume.

This preparation contains 50 per cent. of cod-liver oil.

*Dose.*—8 to 30 mils ( $\frac{1}{4}$  to 1 fluid ounce).

*NOTE.*—Emulsum Olei Morrhuæ, U.S.P., is prepared with 50 of cod-liver oil, 12·5 of powdered acacia, 10 of syrup, 0·4 of oil of gaultheria, and sufficient water to produce 100 by volume.

**EMULSIO OLEI MORRHUÆ COMPOSITA.**

COMPOUND EMULSION OF COD-LIVER OIL.

Cod-liver Oil	...	...	...	...	50·00
Yolk of Egg, by volume	...	...	...	...	6·50
Tragacanth, in powder	...	...	...	...	0·25
Elixir of Gluside	...	...	...	...	0·75
Simple Tincture of Benzoin	...	...	...	...	0·75
Spirit of Chloroform	...	...	...	...	3·00
Essential Oil of Bitter Almonds	...	...	...	...	0·10
Distilled Water, sufficient to produce	...	...	...	...	100·00

Triturate the tragacanth with a little of the cod-liver oil in a dry mortar; add the previously beaten yolk of egg, and stir briskly, gradually adding 30 of distilled water as the mixture thickens. When of a suitable consistence, add the remainder of the oil and water alternately, with constant stirring, avoiding frothing. Transfer to a bottle capable of holding 125, add the elixir, tincture, spirit, and oil of almonds, previously mixed; shake well, and add distilled water, if necessary, to produce 100 by volume.

This emulsion is free from sugar and therefore suitable for diabetic patients.

*Dose.*—8 to 30 mils (2 to 8 fluid drachms).

**EMULSIO OLEI MORRHUÆ CUM HYPOPHOSPHITIBUS.**

EMULSION OF COD-LIVER OIL WITH HYPOPHOSPHITES.

Cod-liver Oil	...	...	...	...	50·00
Yolk of Egg, by volume	...	...	...	...	6·50
Tragacanth, in powder	...	...	...	...	0·25
Elixir of Gluside	...	...	...	...	0·75
Simple Tincture of Benzoin	...	...	...	...	0·75
Spirit of Chloroform	...	...	...	...	3·00
Oil of Bitter Almonds	...	...	...	...	0·10
Sodium Hypophosphite	...	...	...	...	0·75
Calcium Hypophosphite	...	...	...	...	0·75
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the hypophosphites in 30 of the water; then place the tragacanth in a dry mortar, triturate with a little of the oil, add the previously beaten yolk of egg and stir briskly, adding the water solution as the mixture thickens. When of a suitable consistence, add the remainder of the oil and water solution alternately, with constant stirring, avoiding frothing. Finally, transfer to a bottle, add the remaining ingredients, previously mixed, shake well, and add sufficient distilled water to make up the required volume.

Emulsion of cod-liver oil with hypophosphites contains 50 per cent. of cod-liver oil. The emulsion is used especially in phthisis. It is sometimes made with sherry instead of distilled water, and should then be distinguished as *Emulsio Olei Morrhuæ cum Hypophosphitibus et Vino*.

*Dose*.—15 to 30 mls (4 to 8 fluid drachms).

NOTE.—*Emulsum Olei Morrhuæ cum Hypophosphitibus*, U.S.P., is prepared with 50 of cod-liver oil, 12.5 of powdered acacia, 1 of calcium hypophosphite, 0.5 each of potassium and sodium hypophosphites, 10 of syrup, 0.4 of oil of gaultheria, and sufficient water to produce 100 by volume.

## EMULSIO PARAFFINI.

### EMULSION OF PARAFFIN.

*Synonym*.—Aseptic Shaving Cream.

Hard Paraffin (m.p. 55°)	...	...	...	22.00
Prepared Suet	...	...	...	3.00
Soft Soap	...	...	...	2.00
Tragacanth, in powder	...	...	...	2.00
Glycerin	...	...	...	2.00
Oil of Lavender	...	...	...	1.00
Distilled Water, boiling...	...	...	...	68.00

Place the hard paraffin and suet in a vessel surrounded by hot water, add the soap and boiling water, and vigorously beat the mixture until a smooth white emulsion is obtained. Remove the surrounding hot water, and gradually add the tragacanth, continuing the beating and stirring until the temperature has fallen below 50°. When nearly cold add the glycerin and oil of lavender. The product should have the consistence of a smooth, soft paste.

This preparation is used to facilitate the shaving of skin-areas before surgical operations, so as to obviate the use of a shaving-brush and soap. The particles of wax form an embedding film, which supports the hairs during the passage of the razor. A thin layer should be rubbed over the area to be shaved, and the razor immediately applied. Paraffin emulsion may also be used as an ointment basis. It leaves an inconspicuous film upon the surface of the skin, which does not adhere to the patient's clothing.



**EMULSIO PETROLEI CUM GLYCEROPHOSPHATIBUS.**

EMULSION OF PETROLEUM WITH GLYCEROPHOSPHATES.

Liquid Paraffin	...	...	...	33'00
Calcium Glycerophosphate	...	...	...	1'00
Magnesium Glycerophosphate	...	...	...	0'50
Potassium Glycerophosphate	...	...	...	0'50
Sodium Glycerophosphate	...	...	...	0'50
Citric Acid	...	...	...	0'20
Gum Acacia, in powder	...	...	...	16'50
Spirit of Chloroform	...	...	...	4'00
Tincture of Lemon	...	...	...	2'00
Elixir of Gluside	...	...	...	1'00
Distilled Water, sufficient to produce	...	...	...	100'00

Triturate the liquid paraffin with the powdered gum, and add all at once 25 of distilled water. Dissolve the glycerophosphates and citric acid in 16 of distilled water and add the other ingredients, then mix with the emulsion, and add sufficient distilled water to produce the required volume.

This emulsion is used for the same purposes as *Emulsio Petrolei cum Hypophosphitibus*, but there is no evidence to show that glycerophosphates have any useful medicinal action.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

**EMULSIO PETROLEI CUM HYPOPHOSPHITIBUS.**

EMULSION OF PETROLEUM WITH HYPOPHOSPHITES.

Liquid Paraffin	...	...	...	33'00
Calcium Hypophosphite	...	...	...	1'75
Sodium Hypophosphite	...	...	...	1'75
Gum Acacia, in powder	...	...	...	16'50
Tragacanth, in powder	...	...	...	1'00
Oil of Cinnamon	...	...	...	0'10
Elixir of Gluside	...	...	...	1'00
Distilled Water, sufficient to produce	...	...	...	100'00

Triturate the liquid paraffin and the oil of cinnamon with the powdered gums, and add all at once 25 of distilled water. Dissolve the hypophosphites in 15 of distilled water, and add the solution to the paraffin emulsion with constant trituration; finally add the elixir of gluside and dilute with sufficient distilled water to produce the required volume.

This preparation contains 33 per cent. of liquid paraffin. It is used as a nutrient in phthisis, where cod-liver oil disagrees. Doubt has, however, been expressed as to whether liquid paraffin is absorbed and the hypophosphites are absorbed and excreted as such, their action being no different from that of other inorganic salts.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

**EMULSIO THEOBROMATIS.****THEOBROMA EMULSION.**

Oil of Theobroma	...	...	...	...	25'00
Hard Soap	...	...	...	...	3'00
Tragacanth, in powder	...	...	...	...	0'50
Benzoic Acid	...	...	...	...	0'25
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the soap in 25 of the water by the aid of heat, add the hot solution to the oil of theobroma, previously melted, and mix by agitation; then shake in the tragacanth, add the benzoic acid, and make up to 100 with distilled water.

This emulsion is used in the preparation of certain compressed tablets. Where the presence of soap is considered undesirable, 15 of gum acacia may be substituted for the soap. The substance to be compressed is reduced to very fine powder, and triturated with sufficient of the emulsion to make it coherent, but not so damp as to adhere to the meshes of a No. 20 or No. 30 sieve when shaken through without pressure. After being sifted, the mixture is exposed to the air for a few hours, and then compressed into tablets.

**ENEMA ALOES.****ENEMA OF ALOES.**

Aloes	...	...	...	...	...	0'75
Potassium Carbonate	...	...	...	...	...	0'25
Glycerin	...	...	...	...	...	10'00
Mucilage of Starch, sufficient to produce	...	...	...	...	...	100'00

Triturate the aloes with the potassium carbonate, then mix with the glycerin, and finally add the mucilage of starch.

This enema is used to evacuate the bowel. The quantity sufficient for one application is 300 mls (10 fluid ounces).

**ENEMA ASAFETIDÆ.****ENEMA OF ASAFETIDA.**

Tincture of Asafetida	...	...	...	...	3'00
Mucilage of Starch, sufficient to produce	...	...	...	...	100'00

Mix the tincture with the mucilage of starch.

This enema is used to relieve flatulent distension of the bowel. The quantity sufficient for one application is 120 mls (4 fluid ounces).

NOTE.—Enema Asafetidæ, B.P. 1885, was prepared by rubbing asafetida, 30 grains, in a mortar, with distilled water, 4 fluid ounces, the water being added gradually, so as to form an emulsion.

**ENEMA MAGNESII SULPHATIS.**

## ENEMA OF MAGNESIUM SULPHATE.

Magnesium Sulphate	...	...	...	...	6·00
Olive Oil	...	...	...	...	6·00
Mucilage of Starch, sufficient to produce	...	...	...	...	100·00

Dissolve the magnesium sulphate in the mucilage of starch, add the oil, and mix.

This enema is used to evacuate the bowel. The quantity sufficient for one application is 450 mils (15 fluid ounces).

**ENEMA NUTRIENS.**

## NUTRIENT ENEMA.

Beef Tea	...	...	...	...	40·00
Yolk and White of Egg, by volume	...	...	...	...	20·00
Milk, sufficient to produce	...	...	...	...	100·00

Well beat the egg, and mix with the beef tea and milk. Brandy, 10, and pancreatic solution, 2½, may be added if desired. The enema should be administered warm.

This enema is intended to be retained for absorption. The quantity sufficient for one application is 60 to 150 mils (2 to 5 fluid ounces).

**ENEMA OLEI OLIVÆ.**

## ENEMA OF OLIVE OIL.

Olive Oil	...	15 to 75 mils (½ to 2½ fluid ounces)
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This enema should be injected warm. Much larger quantities of the oil are often injected by means of a syphon douche to remove impacted fæces.

**ENEMA OLEI RICINI.**

## ENEMA OF CASTOR OIL.

Castor Oil	...	...	...	...	10·00
Mucilage of Starch, sufficient to produce	...	...	...	...	100·00

Mix the castor oil by agitation with the mucilage of starch.

This enema should be well shaken before use. It is used to assist evacuation of the bowel. The quantity of the mixture sufficient for one application is 300 to 600 mils (10 to 20 fluid ounces).

**ENEMA OLEI RICINI CUM SAPONE.**

## ENEMA OF CASTOR OIL WITH SOAP.

Castor Oil	...	...	...	...	10·00
Soft Soap	...	...	...	...	5·00
Water, warm, sufficient to produce	...	...	...	...	100·00

Dissolve the soap in the water, add the castor oil, and mix by agitation.



This enema should be well shaken before use. The quantity of the mixture sufficient for one application is 300 to 600 mils (10 to 20 fluid ounces).

### ENEMA OPII.

#### ENEMA OF OPIUM.

Tincture of Opium ... .. 3'00

Mucilage of Starch, sufficient to produce ... 100'00

Mix the tincture of opium with the mucilage.

This enema should be administered warm. It is intended to be absorbed as a local or general sedative, generally with the object of inhibiting intestinal movements. The quantity sufficient for one application is 60 mils (2 fluid ounces).

### ENEMA RUTÆ.

#### ENEMA OF RUE.

Confection of Rue ... .. 1'00

Decoction of Barley, sufficient to produce ... 100'00

Mix the confection of rue with the decoction, by trituration.

This enema is used as an anthelmintic, the quantity sufficient for one application being 150 to 200 mils (5 to 7 fluid ounces).

### ENEMA SAPONIS.

#### ENEMA OF SOAP.

Soft Soap ... .. 2'50

Water, warm, sufficient to produce ... 100'00

Dissolve the soap in the water.

This enema is used to evacuate the bowel, the quantity sufficient for one application being 600 mils (20 fluid ounces).

### ENEMA TABACI.

#### ENEMA OF TOBACCO.

Leaf Tobacco ... .. 0'50

Water, boiling, sufficient to produce ... 100'00

Infuse in a covered vessel for half an hour, and strain.

This enema causes muscular relaxation, but is now rarely used on account of the danger of collapse. The quantity sufficient for one application is 240 mils (8 fluid ounces).

### ENEMA TEREBINTHINÆ.

#### ENEMA OF TURPENTINE.

Oil of Turpentine ... .. 2'00

Mucilage of Starch, sufficient to produce ... 100'00

Mix the oil of turpentine with the mucilage, by trituration.

This enema is used to evacuate the bowel, the quantity sufficient for one application being 480 mils (16 fluid ounces).

**ERGOTA.****ERGOT.**

*Synonym.*—Ergot of Rye.

Ergot consists of the dried sclerotium of a fungus, *Claviceps purpurea*, Tulasne (N.O. Pyrenomycetes), the spores of which have developed in the ovary of *Secale cereale*, Linn. (N.O. Gramineæ). The drug is imported chiefly from Spain and Russia. It is sometimes collected by picking from the grain by hand, but is more often separated by sifting. Spanish and Russian are the chief commercial varieties, but others (German, Austrian, Swiss, Swedish) are known. Spanish is larger than the Russian but contains less ergotinine (about 0·20 as compared with 0·25 per cent.). Ergot can also be obtained from wheat and other plants belonging to the Gramineæ, but ergot of rye, which is alone official, is distinguished by its size.

The grains of ergot are dark violet-black in colour, 1 to 4 centimetres long, slender, curved, and tapering towards both ends, somewhat triangular in transverse section. They are longitudinally furrowed, especially on the concave side, break with a short fracture, and are whitish within. The odour and taste are characteristic and disagreeable.

Ergot contains two alkaloids, ergotoxine and ergotinine, the former of which is the chief active constituent of the drug. It is found in the mother liquors from which ergotinine has been crystallised; although an amorphous base, it forms crystalline salts. Ergotinine is crystalline, but as yet amorphous salts only have been prepared from it. Other substances extracted from ergot have been named ergotinic acid, sphacelinic acid or sphacelotoxin, and clavin. The last-named substance has been shown to be inert (Cushny), and neither ergotinic nor sphacelinic acid has been obtained in a state of purity. Ergotinic acid is said to be soluble in water, but insoluble in alcohol; sphacelinic acid, which resembles ergotoxine in its action, is described as being soluble in alcohol, but insoluble in water. Several colouring matters have also been extracted from the drug, viz., scleroxanthin (yellow, crystalline), sclerocrystallin (yellow, crystalline), fuscosclerotic acid (yellowish-brown, amorphous), scleriodin (brown, amorphous). Sclerotinic (sclerotic acid) and picrosclerotine, both of which have been advanced as constituents of ergot, are probably impure ergotinic acid and impure ergotinine respectively; cornutine, formerly regarded as a decomposition product of ergotinine, consists apparently of impure ergotoxine. Ergot contains about 30 per cent. of fixed oil, which can be extracted by petroleum spirit, a phytosterin (ergosterin) being simultaneously removed. The drug also contains trehalose and mannite; it yields about 3 per cent. of ash.

Ergot stimulates plain muscle, directly or indirectly, throughout the body. The peripheral arterioles undergo a prolonged constriction and cause a considerable increase of blood pressure. The heart beats

more vigorously, its systole is more complete and its output is considerably increased. The action of ergot on the uterus is like that on other plain muscle; it augments the contraction of the fibres, and produces a more active peristalsis. It therefore has an emmenagogue effect in the non-gravid condition and an echolic effect upon the gravid uterus. Ergot is employed, almost entirely, to excite uterine contractions. It is thus largely used to check uterine hæmorrhage, and is especially valuable in the third stage of labour. Ergot is also employed, though rarely, to arrest internal hæmorrhage. For all hæmorrhage, other than uterine, it will do positive harm by raising blood pressure. This is especially the case in hæmorrhage from the cerebral and pulmonary vessels, because these vessels are so poorly provided with vaso-motor nerves that not only is the pressure raised in them by ergot, but they are opened up and made to dilate by the augmented pressure. Two types of epidemic ergotism have been described, which are never associated together. There is a gangrenous form which is characterised by agonising pain in the extremities followed by dry gangrene of the peripheral parts of the body (ergotoxine); and a second or nervous type of epidemic which is much more rare and is characterised by paroxysmal epileptiform convulsions. Though the principal constituent of ergot is clearly the alkaloid ergotoxine, other substances as yet undefined must also be present in the drug, because ergotoxine produces little or no action on the heart and does not cause convulsions, whilst galenical preparations of ergot stimulate the heart (Dixon) and may, at times, induce convulsions (Kobert). No method of standardising ergot by chemical means is at present known, but as many specimens of ergot and of its galenical preparations are physiologically inert, it is necessary that their activity should be ascertained by physiological experiment. This may be achieved directly by observation of the power of the drug or preparation to raise blood-pressure through vaso-constriction, or indirectly by observing the effects of such vaso-constriction in causing gangrene of certain peripheral portions of the body. The gangrene so produced is especially manifest in the comb and wattles of fowls, and this test is usually employed to show the activity of the ergot under examination.

The official preparations of ergot for internal use are the extract (ergotin), liquid extract, infusion, and ammoniated tincture. Extractum Ergotæ requires the addition of a little powdered liquorice to make a firm pill. Extractum Ergotæ Liquidum and Infusum Ergotæ are compatible both with acids and alkalies. The liquid extract is most largely used, though the infusion is the more active preparation when made from well dried and carefully stored ergot. Tincture of ferric chloride precipitates the liquid extract and the infusion of ergot. This may be avoided by the addition of a few grains of citric acid. Ammonio-citrate of iron is more compatible with ergot preparations. Injectio Ergotæ Hypodermica should be freshly prepared, and its action is then



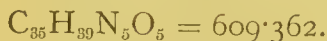
powerful and prompt; separate doses may be enclosed in sterilised sealed glass capsules to avoid contamination of the bulk of the solution.

*Dose of the Fresh Powder.*—12 to 40 decigrams (20 to 60 grains).

NOTE.—Ergot deteriorates rapidly when kept in open vessels and in a damp atmosphere; it should, therefore, be thoroughly dried and preserved in well closed vessels.

## ERGOTININA.

### ERGOTININE.

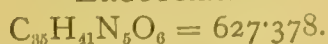


Ergotinine,  $\text{C}_{35}\text{H}_{39}\text{N}_5\text{O}_5$ , is an alkaloid of feebly basic properties, obtained from ergot by extraction of the drug with chloroform or other suitable solvent. It appears to be the anhydride of ergotoxine.

It occurs in white or colourless crystals, which darken rapidly on exposure to light and air, or on heating to about  $210^\circ$ , and melt at temperatures up to  $229^\circ$ . Insoluble in water, soluble in alcohol (1 in 300); in chloroform; in acetone (1 in 26); in ethyl alcohol (1 in 91); in boiling benzene (1 in 77); in amyl alcohol; in xylene; in absolute ether (1 in 1020); insoluble in petroleum spirit. The solutions are strongly dextrorotatory ( $+338^\circ$  for a saturated solution in ethyl alcohol). Prolonged boiling lowers the rotation, as also does the addition of acids and alkalies, apparently on account of transformation to ergotoxine, and possibly also on account of racemisation. Crystalline salts have not, so far, been obtained, as the alkaloid apparently undergoes hydrolysis in attempts to form them. On adding concentrated sulphuric acid to an ether or ethyl acetate solution of the alkaloid, a transient orange colouration is produced, changing to blue. Anhydrous ferric chloride added to its solution in sulphuric acid changes the colour from pale yellow, through orange, crimson, and green, to permanent dark blue. These two reactions, however, are also given by ergotoxine, since the decomposition in both cases is the same. Mayer's reagent precipitates 1 in 1000000.

The physiological action of commercial ergotinine is so slight as to be negligible; the base does not constrict blood vessels, raise the blood pressure, nor excite uterine contractions, and any action it possesses is probably due to the presence of traces of ergotoxine. Ergotinine citrate and hydrochloride are sometimes employed in medicine, the citrate, which occurs as a greyish powder and is soluble in water, being the most commonly used salt. A 1 per cent. solution of the citrate, freshly prepared, is employed for hypodermic use, but injections of ergotinine are much less satisfactory than those of hypodermic injection of ergot or ergotoxine. Ergotinine hydrochloride is a yellowish powder, soluble in water. The usual dose of either salt is about three-fourths that of crystalline ergotinine.

*Dose.*— $\frac{1}{3}$  to  $1\frac{1}{2}$  milligrams ( $\frac{1}{200}$  to  $\frac{1}{40}$  grain).

**ERGOTOXINA.****ERGOTOXINE.**

*Synonym.*—Hydroergotinine.

Ergotoxine,  $\text{C}_{35}\text{H}_{41}\text{N}_5\text{O}_6$ , is an alkaloid of feebly basic properties, obtained from the mother liquors of crystalline ergotinine by extraction with ether.

It occurs as a light, white amorphous powder, practically insoluble in water, though readily soluble in most of the usual organic solvents and in aqueous solution of sodium hydroxide; slightly soluble in ether. It softens at  $155^\circ$ , and gradually melts at  $162^\circ$  to  $164^\circ$ . Its optical rotation has not yet been satisfactorily determined. Towards alkaloidal reagents it is distinctly more sensitive than ergotinine; the best precipitant being potassio-mercuric iodide. It gives the same colour reactions as ergotinine, for the reasons stated under Ergotinina. The salts of the base may usually be prepared by adding a concentrated alcoholic solution of the acid drop by drop to a dilute ethereal solution of the base obtained from the phosphate, avoiding excess in the case of the mineral acids, as they decompose the substance.

Ergotoxine phosphate,  $\text{C}_{35}\text{H}_{41}\text{N}_5\text{O}_6, \text{H}_3\text{PO}_4, \text{H}_2\text{O}$ , may be crystallised from alcohol. It occurs in tufts of needle-shaped crystals, or, when quite pure, in isolated needles. Sparingly soluble in water; soluble in cold alcohol (1 in 313); in boiling alcohol (1 in 14). Melting-point,  $186^\circ$  to  $187^\circ$ , with decomposition. Shaken with cold distilled water, a typical colloidal solution is formed; this contains 1 per cent. of the salt, is strongly opalescent and frothing, and does not deposit any of the salt on standing. The addition of hydrochloric acid produces a thick jelly, but acetic acid leaves the solution liquid. Ergotoxine hydrochloride,  $\text{C}_{35}\text{H}_{41}\text{N}_5\text{O}_6, \text{HCl}$ , may be prepared as described above. It occurs in minute diamond-shaped plates, and long, thin, square-ended needles. Melting-point,  $205^\circ$ . It is a very unstable salt, and therefore difficult to obtain pure. Sparingly soluble in water; readily soluble in hot alcohol. Normal ergotoxine oxalate,  $(\text{C}_{35}\text{H}_{41}\text{N}_5\text{O}_6)_2, \text{H}_2\text{C}_2\text{O}_4$ , may be obtained by adding a solution of oxalic acid in alcohol to a solution of the base in ether, taking care that the base is in excess. It occurs in elongated rectangular plates. Soluble in boiling absolute alcohol (1 in 5); in alcohol at  $25^\circ$  (1 in 12). Acid ergotoxine oxalate,  $\text{C}_{35}\text{H}_{41}\text{N}_5\text{O}_6, \text{H}_2\text{C}_2\text{O}_4$ , may be obtained by shaking a solution of the alkaloid in xylene with excess of a 1 per cent. solution of oxalic acid. It occurs, when crystallised from alcohol and acetone, in minute prisms. Melting-point,  $179^\circ$ , with decomposition. Ergotoxine tartrate occurs in prisms. The salts of ergotoxine have an acid reaction.

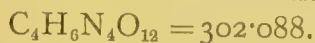
Ergotoxine is the chief active constituent of ergot, and produces all the effects ascribed by Kobert to sphacelinic acid and by Jacoby to sphacelotoxin. At the same time, it does not represent the entire activity of ergot, since it has little or no action on the heart, and does

not cause convulsions. It has a marvellous stimulant action on all plain muscle-tissue, and in particular on the arterioles and uterus. The whole action of ergot on the uterus and the vessels is due to the ergotoxine it contains. The action differs from that of adrenaline, being prolonged in the case of ergotoxine, whilst the action of adrenaline is very transient. Ergotoxine in very large doses causes paralysis of the motor fibres in the sympathetic. In all cases where it is desired to excite the uterus powerfully or to raise blood pressure, ergotoxine should be preferred to the galenical preparations of ergot. It may be employed in the form of hypodermic injections.

*Dose.*—5 to 10 milligrams ( $\frac{1}{12}$  to  $\frac{1}{8}$  grain) daily.

### ERYTHROLIS TETRANITRAS.

ERYTHROL TETRANITRATE.



*Synonyms.*—Tetranitrin; Nitro-erythrite.

Erythrol tetranitrate,  $(\text{CH}_2\text{ONO}_2)_2$   $(\text{CHONO}_2)_2$ , may be prepared by treating erythrol with fuming nitric acid, and, when dissolved, allowing the solution to stand for a short time and then adding an equal volume of concentrated sulphuric acid. The resulting precipitate of erythrol tetranitrate may be recrystallised from boiling water or from alcohol.

It occurs in hard white tasteless crystals, insoluble in cold water, readily soluble in boiling water, alcohol and ether. Melting-point,  $61^\circ$ . Rapidly decomposed by heat and exposure to sunlight.

Erythrol tetranitrate belongs to the class of vaso-dilators—substances that lower blood pressure by dilating the peripheral arterioles. Its action is mild and prolonged, owing to its relative insolubility. The maximum dilatation occurs in from two to three hours. It is the most satisfactory drug to employ where it is desirable to lower blood pressure for a considerable time. Erythrol tetranitrate is used principally in the form of tablets which are made in two strengths, 30 milligrams ( $\frac{1}{2}$  grain) and 60 milligrams (1 grain) in each. An alcoholic solution may also be prepared.

*Dose.*—3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

*NOTE.*—Erythrol tetranitrate is liable to explode on percussion, and should be manipulated with care. It is rapidly decomposed by light and heat, and should be kept in a cool, dark place.

### ERYTHROPHLÆI CORTEX.

SASSY BARK.

*Synonyms.*—Mancona Bark; Red Water Bark; Casca Bark.

Sassy bark is obtained from *Erythrophlæum guineense*, G. Don (N.O. Leguminosæ), a large tree indigenous to the West Coast of Africa.



Other species also possibly yield some of the sassy bark of commerce. The bark is collected from the trunk and branches.

The bark occurs in hard, heavy curved, or flat pieces, often from 7·5 to 10 centimetres long, 5 to 7·5 centimetres wide, and 5 to 9 millimetres thick. The outer surface is warty and irregular, and of a dark reddish colour, often exhibiting, in the older pieces, large conchoidal depressions. The inner surface is longitudinally striated, and is of a dark reddish-brown or black colour. The fracture is short and granular. The transverse section exhibits a narrow brown cork, a narrower and darker cortex separated from the bast by a pale line of sclerenchymatous cells. The bast contains numerous paler groups of sclerenchymatous cells embedded in a reddish-brown parenchymatous tissue. The drug has no odour, and only a slightly bitter, astringent taste.

Sassy bark contains a poisonous alkaloid, erythrophlœine, which resembles digitalin in its properties.

A tincture of sassy bark is prepared for use as a cardiac tonic, but is not much prescribed. Erythrophlœine hydrochloride has local anæsthetic properties, and a 50 per cent. solution in eugenol is used in dentistry.

## ERYTHROPHLŒINÆ HYDROCHLORIDUM.

### ERYTHROPHLŒINE HYDROCHLORIDE.

Erythrophlœine hydrochloride is the salt of a base which exists in sassy bark.

It occurs as a yellowish-white powder. Soluble in water and alcohol, the solutions having an acrid, bitter taste.

Erythrophlœine is a poisonous base, resembling digitalin in its properties. The hydrochloride is used as a cardiac tonic and local anæsthetic. *alcohol* A 50 per cent. solution of the salt in eugenol is used in dental practice as an obtundent, and is said to destroy sensibility without acting directly on the pulp.

*Dose.*—2 to 4 milligrams ( $\frac{1}{32}$  to  $\frac{1}{16}$  grain).

## ESSENTIA AMYGDALÆ COMPOSITA.

### COMPOUND ESSENCE OF ALMONDS.

Essential Oil of Almonds	...	...	...	0·50
Tincture of Vanilla	...	...	...	40·00
Simple Tincture of Benzoin, sufficient to produce	...	...	...	100·00

Mix the oil with the tinctures.

This essence is used as a flavouring agent.

**ESSENTIA ANISI.**

## ESSENCE OF ANISE.

Oil of Anise	...	...	...	...	20'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the oil in the alcohol.

Essence of anise is used as a flavouring agent, and as a stimulating expectorant.

*Dose.*—6 to 12 decimils (10 to 20 minims).

**ESSENTIA CAMPHORÆ.**

## ESSENCE OF CAMPHOR.

*Synonyms.*—Spiritus Camphoræ Fortior ; Rubini's Essence of Camphor.

Camphor...	...	...	...	...	40'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the camphor in the alcohol.

Essence of camphor is a common domestic remedy for catarrhal colds. It is taken on sugar, the dose being repeated hourly.

*Dose.*—1 to 3 decimils (2 to 5 minims).

**ESSENTIA MENTHÆ PIPERITÆ.**

## ESSENCE OF PEPPERMINT.

Oil of Peppermint	...	...	...	...	20'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the oil in the alcohol.

Essence of peppermint is taken on sugar as a carminative against flatulence, and added to mixtures for a similar purpose ; it is also used as a flavouring agent.

*Dose.*—6 to 12 decimils (10 to 20 minims).

**ESSENTIA PULEGII.**

## ESSENCE OF PENNYROYAL.

Oil of Pennyroyal	...	...	...	...	12'50
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the oil in the alcohol.

Essence of pennyroyal is taken on sugar, or with a draught of hot water, as an emmenagogue.

*Dose.*—6 to 12 decimils (10 to 20 minims).

**ETHYLIS BROMIDUM.**

## ETHYL BROMIDE.



*Synonyms.*—Æthylis Bromidum ; Hydrobromic Ether.

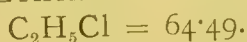
Ethyl bromide,  $\text{C}_2\text{H}_5\text{Br}$ , may be prepared by distilling alcohol, potassium bromide and sulphuric acid, or by the action of phosphorus tribromide on alcohol.

It occurs as a clear, colourless, limpid, strongly refracting neutral liquid with a pleasant ethereal odour and a sweetish warm taste ; insoluble in water, soluble in alcohol or ether. Boiling-point,  $38^{\circ}$  to  $40^{\circ}$ ; specific gravity, 1.453 to 1.457. Sulphuric acid well shaken with an equal volume of ethyl bromide should not be coloured yellow after an hour. If 5 mils of ethyl bromide be shaken with 5 mils of water and 2.5 mils of the water separated, one drop of silver nitrate solution should not produce a turbidity within three minutes. It should leave no residue on evaporation.

Ethyl bromide has been used as an anæsthetic in short operations instead of chloroform, and was said to have the effect of paralysing the vagi, but this is incorrect. Consciousness returns very rapidly, but there is sometimes an after feeling of discomfort. Several deaths have resulted from its use as an anæsthetic, and it is doubtful whether it is safer than chloroform. For inhalation, to relieve migraine and asthma, ethyl bromide is put up in glass capsules encased in silk, containing 3 decimils (5 minims) in each. As a local anæsthetic it is used as a spray, or more often painted over the part, for neuralgia, or it may be made into a liniment with menthol and liniment of belladonna. For general anæsthesia it has been used alone for short nose and throat operations or mixed (a) 1 part with 3 of chloroform, and 4 of alcohol, (b) 1 part with 12 of ethyl chloride, and 7 of methyl chloride. (See Notes to Ethylis Chloridum.)

## ETHYLIS CHLORIDUM.

ETHYL CHLORIDE.



*Synonyms.*—Æthylis Chloridum; Hydrochloric Ether.

Ethyl chloride,  $\text{C}_2\text{H}_5\text{Cl}$ , may be prepared by the action of dry hydrochloric acid gas on absolute alcohol.

It occurs as a colourless, mobile liquid having a sweetish burning taste and an agreeable odour. Slightly soluble in water ; readily soluble in alcohol. Specific gravity, 0.921 (0.918 at  $8^{\circ}$ ). Boiling-point,  $12.5^{\circ}$ . It burns with a smoky green-edged flame, is gaseous at ordinary temperatures, and is generally kept in glass tubes, sealed and fitted with a screw-capped nozzle. It should be free from hydrochloric acid, alcohol, and sulphur compounds.

Ethyl chloride is largely used to produce local anæsthesia in dentistry and minor surgery, the tubes in which it is stored being provided with a tap by which a fine jet of the liquid may be directed upon the part to be anæsthetised at a distance of six or eight inches. Solutions of menthol, eucalyptol, and cocaine in ethyl chloride have been used similarly. For general anæsthesia a specially pure ethyl chloride is prepared, which should be used exclusively. Its use has been recommended in place of nitrous oxide gas ; but its administration requires caution, and several deaths have been reported from



its use. For a sedative inhalation, glass capsules encased in silk are prepared containing 5 minims in each.

NOTES.—Ethyl chloride is also known under the trade-name Kelene. Mixtures of methyl and ethyl chlorides are more volatile than pure ethyl chloride; such mixtures are supplied under the trade-names Anestile (Anæsthy) and Coryl, while a mixture of ethyl bromide, 5, ethyl chloride, 60, and methyl chloride, 35, is known as Soemnoform.

## ETHYLENI DIBROMIDUM.

ETHYLENE DIBROMIDE.



Ethylene dibromide,  $\text{C}_2\text{H}_4\text{Br}_2$ , may be prepared by heating ethyl bromide with bromine in the presence of iron wire, or by the combination of ethylene with bromine.

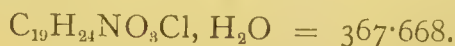
It occurs as a heavy colourless liquid with a characteristic odour. Slightly soluble in water, miscible with alcohol or ether. When placed in a freezing mixture it solidifies, melting again at  $9.5^\circ$ ; boiling-point,  $131^\circ$ ; specific gravity, 2.19.

Ethylene dibromide contains more than 84 per cent. of bromine, and is used occasionally as a sedative in epilepsy. It is best administered in oily solution, and dispensed in gelatin capsules.

*Dose.*—6 to 12 centimils (1 to 2 minims).

## ETHYLMORPHINA HYDROCHLORIDUM.

ETHYLMORPHINE HYDROCHLORIDE.



Ethylmorphine hydrochloride,  $\text{C}_{17}\text{H}_{18}\text{NO}_3\text{C}_2\text{H}_5\text{HCl}, \text{H}_2\text{O}$ , may be obtained by the action of ethyl iodide on morphine in alkaline solution. The base formed—ethylmorphine or codethylene—is neutralised with hydrochloric acid.

It occurs as a white, minutely crystalline powder, odourless and having a bitter taste. Soluble in water (about 1 in 7), and in alcohol (about 1 in 5), but nearly insoluble in ether and chloroform. Its aqueous solution is precipitated by the usual alkaloidal reagents. Melting-point, about  $124^\circ$ . The addition of ferric chloride to a solution of 1 decigram in 10 mils sulphuric acid, which is colourless, produces a violet or blue colouration, and the further addition of 1 or  $1\frac{1}{2}$  decimils of nitric acid changes it to deep red. It may be distinguished from morphine by adding 10 mils of a 1 per cent. aqueous solution to a mixture of 10 mils of weak solution of potassium ferricyanide and  $\frac{1}{2}$  decimil of solution of ferric chloride, when the mixture does not change immediately to blue, but slowly assumes a blue-green colour. Morphine under the same conditions produces an immediate dark blue colour. Ethylmorphine can scarcely be distinguished from codeine by its colour reactions, but

whilst codeine is precipitated from 5 mils of a 10 per cent. solution of its hydrochloride by adding 1 or 2 decimils of ammonia solution (specific gravity, 0.910), and is permanently dissolved when 1 mil of ammonia is added, ethylmorphine when precipitated in similar manner is only dissolved by 5 mils of ammonia, and the solution after a short time deposits crystals which melt at 93°. This precipitation is evident even in solutions containing only 1 per cent.

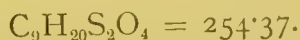
Ethylmorphine hydrochloride is intermediate in its properties between morphine and codeine; it does not depress the respiratory centre to the same extent as morphine, but soothes the appreciation of peripheral sensation similarly to codeine. It is therefore employed to allay cough in bronchitis, bronchial asthma, and whooping-cough. It is narcotic and sedative. It may be used combined as a syrup, or may be prepared in the form of pills. For hypodermic injection, 6 milligrams ( $\frac{1}{10}$  grain) may be dissolved in 3 decimils (5 minims) of water for a dose.

*Dose.*—6 to 30 milligrams ( $\frac{1}{10}$  to  $\frac{1}{2}$  grain).

*NOTE.*—This compound is also known under the trade-name Dionin.

## ETHYLSULPHONALUM.

ETHYLSULPHONAL.



*Synonym.*—Diethylsulphone-diethylmethane.

Ethylsulphonal,  $(\text{C}_2\text{H}_5)_2\text{C}(\text{SO}_2\text{C}_2\text{H}_5)_2$ , is diethylsulphone-diethylmethane, a compound analogous in composition to sulphonal, but has two methyl groups replaced by two ethyl groups, or four ethyl groups altogether. It may be prepared in the same way as sulphonal, but diethylketone is used in place of acetone, resulting in the formation of diethylketone-mercaptol, which yields ethylsulphonal on oxidation with potassium permanganate.

It occurs in the form of glistening, white, crystalline tablets, or acicular crystals, or as a white crystalline powder, odourless, and having a camphoraceous bitter taste. Soluble in cold water (1 in 550), more so in hot water, in alcohol (1 in 12), fairly soluble in ether. Melting-point, 85°. The aqueous solution is neutral. If 1 gramme be heated with 50 mils of water, cooled, and filtered, the filtrate should give no reactions with the tests for chlorides or sulphates, and no odour should be perceived during the heating.

Ethylsulphonal differs little in its medicinal properties from sulphonal, but is often given in preference to it on account of its greater solubility in alcohol. Another similar compound is methylsulphonal, which is much more soluble both in water and in alcohol.

*Dose.*—6 to 12 decigrams (10 to 20 grains).

*NOTE.*—Ethylsulphonal is also known under the trade-name Tetronal.

**EUCALYPTI FOLIA.**

EUCALYPTUS LEAVES.

*Synonym.*—Eucalyptus.

Eucalyptus leaves are obtained from the blue gum tree, *Eucalyptus Globulus*, Labill. (N.O. Myrtaceæ), indigenous to Tasmania and Eastern Australia, but cultivated in Southern Europe. The dried, upper, ensiform leaves are used.

The leaves on young plants are ovate, cordate at the base, and sessile, the upper and outer leaves of older trees are longer, ensiform, and shortly stalked, the stalks being often twisted so as to bring the surfaces of the leaf vertical instead of horizontal. They may attain 30 centimetres in length, and are thick, coriaceous and glabrous. The mesophyll contains numerous oil-glands which may be seen by strong transmitted light. Odour, when crushed, camphoraceous; taste, aromatic, pungent, and slightly bitter.

The leaves contain from 1.5 to 3 per cent. of volatile oil, together with tannin and a bitter principle.

Eucalyptus leaves are smoked in the form of cigarettes to relieve asthma. An infusion of the leaves (1 in 20) has been recommended for diabetes in doses of 30 to 60 mils (1 to 2 fluid ounces).

**EUCALYPTI GUMMI.**

EUCALYPTUS GUM.

*Synonym.*—Red Gum.

Eucalyptus gum is an exudation from the bark of *Eucalyptus rostrata*, Schlecht (N.O. Myrtaceæ), and other species of *Eucalyptus*. It is a variety of Botany Bay kino (see Kino Eucalypti). The trees are natives of Australia, whence the gum is imported. It is obtained by incising the tree, and inserting a trough-shaped piece of tin, by means of which the treacly liquid flows into buckets or tins, when it becomes dry within a few days. It is also found in the dry state in cavities in the trunks of the trees.

The gum should be in small, dark reddish-brown, opaque, and more or less dusty pieces, which yield a pale red powder. When chewed it is tough, has an astringent taste, and adheres to the teeth, colouring the saliva red. Cold water should dissolve from 80 to 90 per cent. Bright ruby-coloured gum is less soluble, and not so suitable for medicinal use.

The chief constituent of eucalyptus gum is tannic acid (kinotannic acid), of which it contains about 47 per cent. Other constituents which may be present are a phlobaphene (kino red), a gelatinisable tannin glucoside, catechin, and pyrocatechin (catechol).

Eucalyptus gum is a valuable astringent to the throat, and is largely used in the form of lozenges and pastilles. Its action is similar to that of kino, but weaker and more prolonged. Trochiscus Eucalypti Gummi is the official lozenge; other combinations are with potassium chlorate and cubebs, or with cocaine and menthol. Extractum Eucalypti Gummi Liquidum is an astringent and styptic



solution; injected into the nose or applied to wounds on lint, it stops hæmorrhage. Diluted with 16 parts of water it is used as an astringent gargle, or with 40 parts of water as an astringent injection. The tincture is used similarly. The powdered gum, the tincture, and the liquid extract are used internally as astringents in diarrhœa and dysentery. An astringent syrup prepared from the gum is added to gargles, or given internally. Suppositories may contain 30 centigrams (5 grains) of eucalyptus gum, and pessaries, 60 centigrams (10 grains), with cacao butter.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

## EUCALYPTOL.

### EUCALYPTOL.



*Synonyms.*—Cineol; Cajuputol.

Eucalyptol,  $\text{C}_{10}\text{H}_{18}\text{O}$ , is obtained chiefly from oil of eucalyptus, but also occurs in oil of cajuput and other oils.

It occurs as a colourless liquid with a characteristic aromatic camphoraceous odour, and a pungent, spicy, and cooling taste. Specific gravity, 0·930 (0·925 at 25°). Boiling-point, 176° to 177°. Refractive index, 1·4559. Optically inactive. When placed in a freezing mixture it solidifies to a mass of colourless crystals, which, when pure, melt again at -1°. Miscible in all proportions with alcohol, carbon bisulphide, and glacial acetic acid. It yields characteristic loose addition products with bromine, hydrochloric acid, hydrobromic acid and phosphoric acid. If a portion be shaken with an equal volume of sodium hydroxide solution it should not decrease in bulk; its alcoholic solution should be neutral to test paper, and should not assume a brownish or violet colour on the addition of a drop of ferric chloride solution (absence of phenols). If 1 mil of phosphoric acid be gradually added to 1 mil of eucalyptol placed in a freezing mixture, a solid white crystalline mass of cineol-phosphoric acid should be obtained, from which cineol should separate on the addition of warm water. A less pure substance obtained by simple fractionation of oil of eucalyptus, is also sold as eucalyptol. This will not solidify entirely on cooling to about -5°. It has a specific gravity from 0·90 to 0·915 and is optically active.

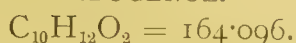
Eucalyptol is to be preferred to oil of eucalyptus, both for internal administration and for inhalation. For internal use capsules are prepared, containing 6 or 12 centimils (1 or 2 minims). Inhaled from hot water or from an oro-nasal inhaler, it is less irritating, and in the latter method more completely volatilisable, than oil of eucalyptus. Oily spray solutions contain from 1 part in 30 to 1 in 16, with liquid paraffin.

*Dose.*—½ to 3 decimils (1 to 5 minims).

*NOTE.*—Eucalyptol should be preserved in well-stoppered bottles, protected from the light.

**EUGENOL.**

EUGENOL.

*Synonym.*—Eugenic Acid.

Eugenol,  $\text{C}_6\text{H}_3\text{C}_3\text{H}_5\text{OCH}_3\text{OH}$ , is a phenol found in oil of cloves, oil of pimento, and other oils. It may be obtained by shaking oil of cloves with excess of a 5 or 10 per cent. solution of sodium hydroxide, drawing off the resulting solution of eugenol-sodium, washing it with ether and decomposing by means of diluted sulphuric acid. The eugenol which separates is washed with solution of sodium carbonate and finally distilled with steam or *in vacuo*.

It occurs as a colourless or slightly yellow optically inactive liquid, with an odour of cloves and a pungent spicy taste, soluble in all proportions of alcohol, ether, chloroform and glacial acetic acid. Specific gravity, 1.072 to 1.074. Boiling-point,  $251^\circ$  to  $253^\circ$ . It should be entirely and readily soluble in diluted solution of sodium hydroxide. It gives a blue colour on the addition of solution of ferric chloride to its alcoholic solution; on oxidation with potassium permanganate it yields vanillin.

Eugenol is an antiseptic and is not toxic. It has local anæsthetic properties and is a useful solvent of other local anæsthetics, such as pure cocaine, or erythrophlœine hydrochloride for use in dental practice. An antiseptic ointment of eugenol with hydrous wool fat has been used for eczema. Eugenol is given internally, in the same manner as oil of cloves in phthisis, as a carminative and antiseptic

*Dose.*— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

*NOTE.*—Eugenol should be preserved in well-stoppered bottles, protected from the light.

**EUONYMI CORTEX.**

EUONYMUS BARK.

*Synonym.*—Euonymus.

Euonymus bark is the dried root-bark of *Euonymus atropurpureus*, Jaquin (N.O. Celastrineæ), a shrub common in the eastern United States. The root and stem bark are both collected, but the former is alone official.

It occurs in small quilled or curved pieces, from 2 to 4 millimetres thick, about 7.5 centimetres in length, and 12.5 millimetres in width. The outer layer of the bark consists of a soft spongy cork, light ash-grey in colour, but marked with darker lines and patches. The inner surface is pale yellow and smooth when free from fragments of the wood. The bark breaks with a short fracture, and if the two pieces are gently separated from one another, delicate elastic threads can be seen connecting them. The odour is faint, but characteristic, the taste bitter and acrid.

The chief constituent of the bark is a nearly colourless, amorphous, bitter principle, to which the name euonymin has been applied, as

well as to a crystalline glucoside which is also present in this drug. Both principles must be distinguished from commercial euonymin (see *Extractum Euonymi*), which is a powdered extract of the drug. The bark contains laticiferous cells in which a substance resembling caoutchouc is secreted; this substance forms the elastic threads above referred to.

*Euonymus* bark is used in medicine in the form of *Extractum Euonymi* and *Tinctura Euonymi*. It increases the flow of bile, and is said to be especially indicated in "torpid liver." The dry extract is made into pills with syrup of glucose, or combined with iridin or the extracts of cascara, henbane, or *nux vomica*; it is also prepared in tablet and capsule form, especially with cascara. Tincture of euonymus is given with digestives and liver stimulants (see *Elixir Euonymi et Pepsini* and *Liquor Euonymi et Cascaræ*).

## EUPHORBIAE HERBA.

### EUPHORBIA.

*Euphorbia* is the entire aerial portion of *Euphorbia pilulifera*, Linn. (N.O. *Euphorbiaceæ*), an annual herb indigenous to the hotter parts of India, and growing in most other tropical countries. The plant is collected while flowering and fruiting, and dried.

The drug consists of the stem, leaves, flowers, and fruits of the plant. The stem is slender and cylindrical, and covered with coarse, bristly hairs. It bears opposite, dark green leaves, from 18 to 36 millimetres long, ovate or obliquely lanceolate in shape, with a dentate margin; they are brittle when dried, and are usually much broken in the drug. The flowers are small and crowded together in dense cymes about 1 centimetre in diameter. The fruit is a yellow, three-celled, keeled capsule, containing reddish minute ovoid tetragonal seeds, which are wrinkled when mature. The drug has no odour, but a bitter taste.

The chief constituent of the drug appears to be an unstable poisonous glucoside, but it has not yet been isolated.

A decoction or infusion of *euphorbia* is prepared (1 in 40) and is taken in tablespoonful doses in bronchial and asthmatic conditions. *Tinctura Euphorbiæ* is prescribed in mixture form with *lobelia*, *senega*, and other anti-asthmatics, for use in coryza and hay fever.

## EUPHORBIIUM.

### EUPHORBIIUM.

*Euphorbium* is a resin obtained from *Euphorbia resinifera*, Berg. (N.O. *Euphorbiaceæ*), a plant common in the mountainous districts of Morocco. The plant produces fleshy quadrangular stems, bearing small scaly leaves, supported by two thorny stipules. The cortex and pith contain long laticiferous cells; when the stem is incised, the latex is exuded as milky drops, which harden on exposure to



air, and form resinous masses which are collected and brought to Morocco for sale. It is exported chiefly from Mogadore.

The drug occurs in dull yellow or brown tears or irregular masses often mixed with pieces of stem and other impurities. It is partially soluble in alcohol (62 per cent.), ether (56 per cent.), and water (32 per cent.), but almost completely in glacial acetic acid. Euphorbium may be identified by allowing a petroleum spirit extract to flow over the surface of sulphuric acid containing one drop of nitric acid in 20 mils; a blood-red zone should be produced.

It consists chiefly of euphorbone (40 per cent.), resene (21 per cent.), and salts of malic acid (25 per cent.). Euphorbone occurs in tasteless, odourless, colourless crystals, melting at  $115^{\circ}$  to  $116^{\circ}$ . The resene is yellowish-brown in colour, amorphous, and tasteless. All attempts to isolate the acrid principle, which is soluble in water, alcohol, and ether, have failed; it has only been obtained in the form of a resinous mass with intensely acrid taste. The drug contains no gum.

Euphorbium is emetic and powerfully cathartic. On account of its violent action its use internally has been abandoned. Externally it acts as a vesicant, and as such is used in veterinary practice. Powdered euphorbium is a powerful irritant to the nasal mucous membrane, causing violent sneezing.

### EXTRACTUM ACALYPHÆ LIQUIDUM.

#### LIQUID EXTRACT OF ACALYPHA.

Acalypha, dried, and in No. 40 powder	...	100·00
Alcohol, sufficient to produce	... ..	100·00

Add sufficient alcohol to the drug to moisten it thoroughly, and, after standing for forty-eight hours, percolate till exhausted. Reserve the first 75 of percolate, recover the alcohol from the subsequent percolate by distillation, evaporate, dissolve the resulting soft extract in the reserved percolate, and add sufficient alcohol to make up the required volume.

Liquid extract of acalypha has expectorant and emetic properties, similar to those of senega and ipecacuanha.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

*NOTE.*—Liquid extract of acalypha is official in India and the Eastern Colonies.

### EXTRACTUM ACONITI.

#### EXTRACT OF ACONITE.

Aconite Leaves and Flowering Tops, fresh... 100·00

Press out the juice from the bruised, fresh leaves, and flowering tops, heat it to  $54^{\circ}$ , and strain through calico to remove the chlorophyll. Heat the strained liquid to  $93^{\circ}$ , remove the coagulated albumen by filtration, evaporate the filtrate to a thin syrup by the heat of a water-bath, add the previously separated chlorophyll after passing it

through a hair sieve, stir, and evaporate to a soft extract at a temperature not exceeding 60°. The alkaloidal strength of this extract is very variable, ranging from 0·2 to 0·66 per cent.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

NOTES.—Extractum Aconiti was official in the British Pharmacopœia, 1885. Fluidextractum Aconiti, U.S.P., is prepared by exhausting aconite root, in No. 60 powder, with 95 per cent. alcohol mixed with one-third its volume of water, and adjusting the strength of the product so that it shall contain 0·4 per cent. w/v of aconitine.

## EXTRACTUM ADHATODÆ LIQUIDUM.

### LIQUID EXTRACT OF ADHATODA.

Adhatoda, dried, and in No. 40 powder ... 100·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 40 of the alcohol to the drug, pack the mixture in a percolator, saturate it with alcohol, and after standing for forty-eight hours, percolate till exhausted. Reserve the first 85 of percolate, recover the alcohol from the subsequent percolate by distillation, evaporate, dissolve the resulting soft extract in the reserved percolate, and add sufficient alcohol to make up the required volume.

Liquid extract of adhatoda is official in India and the Eastern Colonies. It is used in pulmonary affections, and as an internal antiseptic in phthisis. A syrup may be made by diluting the liquid extract with 7 parts of syrup.

*Dose.*—1½ to 4 mils (20 to 60 minims).

## EXTRACTUM AGROPYRI LIQUIDUM.

### LIQUID EXTRACT OF COUCH GRASS.

*Synonyms.*—Extractum Tritici Liquidum; Liquid Extract of Triticum.

Couch Grass, cut small ... 100·00

Distilled Water, boiling, a sufficient quantity.

Alcohol, sufficient to produce ... 100·00

Add the drug to 500 of the boiling water, allow to digest for six hours, and strain; submit the marc twice to the same treatment with equal quantities of boiling water, mix the three liquids, and evaporate the whole to 75. Finally, add 25 of alcohol, set the mixture aside for twenty-four hours, filter, and add sufficient alcohol to make up the required volume.

This preparation is said to be demulcent and diuretic. It is official in the Australasian Colonies, the Eastern Colonies, and the North American Colonies, where the proportion of alcohol may be increased to one-fourth by weight of the finished product, in order to prevent fermentation.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

NOTE.—This preparation corresponds to Fluidextractum Tritici, U.S.P.

**EXTRACTUM ALETRIDIS LIQUIDUM.**

LIQUID EXTRACT OF ALETRIS.

Aletris Rhizome in No. 60 powder ... .. 100·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Exhaust the drug by percolation. Reserve the first 80 of percolate; concentrate the subsequent percolate to a soft extract, dissolve this in the reserved percolate, and add sufficient of the alcohol to make up the required volume.

Liquid extract of aletris is used as a uterine tonic. It is conveniently given flavoured with liquorice and simple elixir as Elixir Aletridis.

*Dose.*—3 to 10 decimils (5 to 15 minims).

**EXTRACTUM ALOES BARBADENSIS.**

EXTRACT OF BARBADOS ALOES.

Barbados Aloes, broken small... .. 10·00

Distilled Water, boiling ... .. 100·00

Add the aloes to the water and allow to digest for twenty-four hours; then decant, strain, and evaporate the liquid to dryness at a temperature not exceeding 60°.

The resulting extract is about equal to one-third more than its weight of the powdered aloes.

This extract may be made into a pill with diluted alcohol, preferably with the addition of a little inert vegetable powder. It is a common ingredient of "dinner pills," with mastic, extract of nux vomica, and belladonna or henbane. The addition of a small quantity of soap hastens the action of aloes preparations. Glacial extract of aloes is prepared by macerating aloes in cold water, and evaporating the clear solution *in vacuo* at a low temperature. It is considered to be more active than the extract prepared with boiling water.

*Dose.*— $\frac{1}{2}$  to 2 $\frac{1}{2}$  decigrams (1 to 4 grains).

NOTE.—Extractum Aloes, U.S.P., is prepared by exhausting Barbados or Socotrine aloes with boiling water, and evaporating the solution to dryness.

**EXTRACTUM ALOES SOCOTRINÆ.**

EXTRACT OF SOCOTRINE ALOES.

Socotrine Aloes, broken small ... .. 10·00

Distilled Water, boiling ... .. 100·00

Add the aloes to the water and allow to digest for twenty-four hours; then decant, strain, and evaporate the liquid to dryness at a temperature not exceeding 60°.

The resulting extract is about equal to twice its weight of the powdered aloes.



This extract may be made into a pill with diluted alcohol, preferably with the addition of a little inert vegetable powder.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  decigrams (1 to 4 grains).

*NOTE.*—This extract was official in the British Pharmacopœia, 1885.

### EXTRACTUM ANTHEMIDIS.

#### EXTRACT OF CHAMOMILE.

Chamomile Flowers	...	...	...	10.00
Oil of Chamomile	...	...	...	0.02
Distilled Water...	...	...	...	100.00

Add the flowers to the water and boil until the volume is reduced to one-half; then strain, press, filter, and evaporate the filtrate to a soft extract, adding the oil towards the end of the process.

Extract of chamomile is added to pills containing rhubarb and aloes, for its carminative properties.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

### EXTRACTUM ANTHEMIDIS LIQUIDUM.

#### LIQUID EXTRACT OF CHAMOMILE.

Chamomile Flowers, in No. 20 powder ... 100.00

Alcohol (70 per cent.), sufficient to produce ... 100.00

Exhaust the drug by percolation, reserve the first 80 of percolate, concentrate the remainder to a syrupy consistence, and add to the reserved portion, making up to the required volume with more of the menstruum.

Liquid extract of chamomile is used as a carminative.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### EXTRACTUM APOCYNII LIQUIDUM.

#### LIQUID EXTRACT OF APOCYNUM.

*Synonym.*—Liquid Extract of Canadian Hemp.

Apocynum, in No. 60 powder ... 100.00

Glycerin ... 10.00

Alcohol, a sufficient quantity.

Distilled Water, a sufficient quantity.

Mix the glycerin with 65 of the alcohol and 25 of distilled water; then percolate the powdered root with the mixture, continuing the percolation with a mixture of alcohol, 13, and distilled water, 7, until the drug is exhausted. Reserve the first 80 of percolate, evaporate the remainder to a soft extract, dissolve in the reserved portion, and add sufficient menstruum to produce 100.

Liquid extract of apocynum is a powerful cardiac tonic, belonging to the digitalis group; it is said to be especially valuable in dropsy and pleurisy with effusion, but it is very irritant to the gastrointestinal canal. The extract is a constituent of some American nostrums.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—This preparation corresponds to Fluidextractum Apocyhi, U.S.P.

**EXTRACTUM ARNICÆ LIQUIDUM.**

LIQUID EXTRACT OF ARNICA.

Arnica Rhizome, in No. 60 powder ... 100·00

Alcohol, a sufficient quantity.

Distilled Water, a sufficient quantity.

Exhaust the drug by percolation with a mixture of alcohol, 3, and distilled water, 1. Reserve the first 80 of percolate, evaporate the remainder to a soft extract, dissolve in the reserved portion, and add sufficient menstruum to produce 100.

Liquid extract of arnica is diluted with 20 parts of warm water for application on lint to bruises and swellings, instead of the tincture.

**EXTRACTUM BELÆ LIQUIDUM.**

LIQUID EXTRACT OF BAEL.

Bael Fruit, in No. 20 powder ... 100·00

Distilled Water... 1500·00

Alcohol, sufficient to produce ... 100·00

Add the drug to 500 of water, allow to macerate for twelve hours, and decant the clear liquid; submit the marc twice to the same treatment for one hour with equal quantities of the water, then press the marc, mix the liquids, and filter through flannel. Finally, evaporate the mixture to 75, cool, and add sufficient alcohol to make up the required volume, filtering if necessary.

Liquid extract of bael prepared from the fruit imported in dried slices, as formerly used in this country, did not uphold the reputation gained by preparations of the fresh fruit in India, where it is a popular remedy for diarrhœa and dysentery. The extract is especially suited to children, since its use is not followed by constipation.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

*NOTE.*—Liquid extract of bael is official in India and the Eastern Colonies, where the proportion of alcohol may be increased to one-fourth by weight of the finished product in order to prevent fermentation.

**EXTRACTUM BELLADONNÆ ALCOHOLICUM.**

ALCOHOLIC EXTRACT OF BELLADONNA.

*Synonym.*—Extract of Belladonna Root.

Liquid Extract of Belladonna ... 100·00

Milk Sugar, a sufficient quantity.

Evaporate the liquid extract of belladonna to a thin syrup, and add sufficient milk sugar to produce 75 by weight of a granular, yellowish-brown, slightly coherent powder, containing 1 per cent. of the alkaloids of belladonna root. The proportion of milk sugar required is determined by placing liquid extract of belladonna, 5, in a counterpoised basin on a water-bath, evaporating to a moderately

firm extract, and weighing. The difference between 3.75 and the weight of the residue gives the weight of milk sugar to be used as a diluent for each 5 of liquid extract.

Alcoholic extract of belladonna is a yellowish-brown, slightly coherent powder. It is sometimes found in the form of a paste which tends to absorb moisture on exposure to air. Such extracts are made from liquid extract of belladonna prepared by modifications of the official process, which yield an undesirable amount of extractive, the presence of which is the more inconvenient because it displaces an equal weight of milk sugar. Only the powder form should be used in dispensing, on account of its greater permanency. When "Extractum Belladonnæ" is prescribed it is customary to dispense Extractum Belladonnæ Viride, except (in the case of prescriptions written since 1898) for the preparation of suppositories and pessaries, in dispensing which Extractum Belladonnæ Alcoholicum should be used, as in the official formula for Suppositoria Belladonnæ.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

### EXTRACTUM BELLADONNÆ EXSICCATUM.

DRIED EXTRACT OF BELLADONNA.

*Synonyms.*—Extractum Belladonnæ Folii Exsiccatum; Dried Extract of Belladonna Leaves.

Belladonna Leaf, in No. 40 powder ... .. 100.00  
Alcohol (70 per cent.), a sufficient quantity.

Moisten the drug with 25 of the alcohol, pack in a percolator, and percolate till the product measures 400. Press the marc, mix the liquids, and filter. Assay the filtrate for dry extract and for alkaloid. Having thus ascertained the amount of extract that the remainder of the filtrate will yield and the amount of alkaloid that will be contained in it, calculate the quantity of powdered belladonna leaves of known alkaloidal value that must be added to reduce the alkaloidal value of the extract to 1 per cent. Add rather less than this quantity of powdered leaves to the remainder of the filtrate. Recover the alcohol by distillation, and dry the residue in a flat tared dish, first over a water-bath, and then in a current of warm air from 60° to 80° until the weight is fairly constant. Calculate the additional weight of diluent required, and add to the product. Transfer the whole to a warm mortar, and triturate until well mixed. Pass through a No. 20 sieve, and transfer to a well-stoppered bottle.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTES.*—Dried extract of belladonna leaf must be preserved in a cool dry place. The extract is hygroscopic, and to counteract this it is desirable to use as diluent a powdered leaf of sufficiently high alkaloidal content so that the finished product contains at least two of diluent to one of extract. Extractum Belladonnæ Foliorum, U.S.P., is prepared by exhausting belladonna leaves, in No. 60 powder, with 95 per cent. alcohol mixed with half its volume of water, evaporating the product to a pilular consistence, and adjusting its strength so that it shall contain 1.4 per cent. of mydriatic alkaloids, adding powdered milk sugar, if necessary, as a diluent.



**EXTRACTUM BELLADONNÆ LIQUIDUM.**

LIQUID EXTRACT OF BELLADONNA.

Belladonna Root, in No. 20 powder ... 256·00

Alcohol, a sufficient quantity.

Distilled Water, a sufficient quantity.

Divide the drug into four portions. Moisten one portion with 48 of a mixture of 7 of alcohol and 1 of water and set aside for six hours; pack firmly in a percolator, add 48 of the same menstruum and set aside for twenty-four hours; then percolate slowly, collecting the percolate in small portions, and adding more of the menstruum as required. Repeat the operation with a second portion, moistening the drug with the first 48 of percolate, and using as menstruum the liquid collected from the first percolator. Again repeat the process with the third and fourth portions, using the liquid from the second percolator to extract the third portion, and the liquid from the third percolator to extract the fourth. Collect 100 of the strong percolate from the fourth percolator, and standardise and adjust so that the finished product shall contain 0·75 per cent. of alkaloids.

Liquid extract of belladonna has a deep sherry colour, a specific gravity of 0·917 to 0·925, and contains from 12 to 13 per cent. of total solids. Liquid extracts of a darker colour and containing a higher percentage of total solids are found in commerce. These are probably made by processes which yield more extractive than the official process, the drug being exhausted by percolation and the percolate concentrated by evaporation—thus causing a darkening in colour, and possibly alteration of the alkaloids by the heat employed. Liquid extract of belladonna is used in the preparation of the official plaster, alcoholic extract, liniment, tincture and ointment of belladonna. A dose is not given, as, on account of its powerful nature, it is intended to be prescribed for internal use in the diluted form as *Tinctura Belladonnæ*.

NOTE.—*Fluidextractum Belladonnæ Radicis*, U.S.P., is prepared by exhausting belladonna root, in No. 60 powder, with 95 per cent. alcohol mixed with one-fourth its volume of water, and adjusting the strength of the product so that it shall contain 0·5 per cent. w/v of alkaloids.

**EXTRACTUM BELLADONNÆ VIRIDE.**

GREEN EXTRACT OF BELLADONNA.

*Synonym.*—Extract of Belladonna.

Belladonna Leaves and Young Branches, fresh ... 100·00

Press out the juice from the bruised fresh leaves and young branches, heat it to 54°, and strain it through calico to remove the chlorophyll. Heat the strained liquid to 93°, remove the coagulated albumen by filtration, evaporate the filtrate to a thin syrup by the heat of a water-bath, add the previously separated chlorophyll after passing it through a hair sieve, stir, and evaporate to a soft extract at a temperature not exceeding 60°.

*Extractum Belladonnæ Viride* is commonly prescribed in pill form, with purgatives, to diminish their tendency to gripe; with camphor

and quinine, against nasal catarrh; with camphor or the valerianates as a sedative. For external use the green extract is sometimes softened with warm water and spread upon leather for local application, or used in the form of *Glycerinum Belladonnæ* to allay pain or arrest glandular secretion. Eye lotions contain 6 or 12 centigrams (1 or 2 grains) of the green extract in 30 mils (1 fluid ounce). The green extract is sometimes specified for use in suppositories; it must be rubbed to a smooth consistence with a few drops of warm water before mixing with the fat, just melted. Excess of heat separates the chlorophyll. When "*Extractum Belladonnæ*" is prescribed, it is customary to dispense *Extractum Belladonnæ Viride*, except in such cases as described under *Extractum Belladonnæ Alcoholicum*.

*Dose*.—15 to 60 milligrammes ( $\frac{1}{4}$  to 1 grain).

*NOTE*.—This extract is not standardised, but when made from herb of good quality it contains about 1 per cent. of alkaloid.

## EXTRACTUM BUCHU LIQUIDUM.

### LIQUID EXTRACT OF BUCHU.

Buchu Leaves, in No. 40 powder	...	...	100.00
Alcohol, sufficient to produce	...	...	100.00

Add 40 of the alcohol to the drug, pack the mixture in a percolator, saturate it with alcohol, and, after standing for forty-eight hours, percolate till exhausted. Reserve the first 85 of percolate, recover the alcohol from the subsequent percolate by distillation, evaporate, dissolve the resulting soft extract in the reserved percolate, and add sufficient alcohol to make up the required volume.

Liquid extract of buchu contains the volatile oil and alcohol-soluble constituents of the leaves in greater concentration than in *Tinctura Buchu*. It may be prescribed in place of the latter when a minimum of alcohol is desired with fresh infusion of buchu.

*Dose*.—3 to 12 decimils (5 to 20 minims).

*NOTE*.—*Fluidextractum Buchu*, U.S.P., is prepared by exhausting buchu, in No. 60 powder, with 95 per cent alcohol mixed with one-third of water.

## EXTRACTUM CALUMBÆ.

### EXTRACT OF CALUMBA.

Calumba Root, cut small	...	...	100.00
Alcohol (60 per cent.), a sufficient quantity.			

Add 250 of the alcohol to the drug, allow to macerate for twelve hours, then strain, and press. Repeat the operation with the marc, using the same quantity of alcohol; then mix and filter the liquids, recover the spirit by distillation, and evaporate on a water-bath to a soft extract.

Extract of calumba may be dispensed with the salts of iron in pill form owing to its freedom from astringency.

*Dose*.—1 to 5 decigrams (2 to 8 grains).

NOTES.—*Extractum Calumbæ* was official in the British Pharmacopœia, 1885. *Fluidextractum Calumbæ*, U.S.P., is prepared by exhausting calumba, in No. 20 powder, with 95 per cent. alcohol mixed with three-sevenths its volume of water.

## EXTRACTUM CANNABIS INDICÆ.

EXTRACT OF INDIAN HEMP.

*Synonym.*—Extract of Indian Cannabis.

Indian Hemp, in coarse powder ... .. 100·00  
Alcohol, a sufficient quantity.

Exhaust the drug by percolation, and evaporate the percolate to form a soft extract.

Commercial extracts of Indian hemp vary considerably, containing, with the green ether-soluble substance, indefinite amounts of a brown extractive insoluble in ether. The extract deteriorates on keeping owing to slow oxidation; it should be stored in small full jars hermetically sealed. The physiological action of different samples of the extract is very unequal, so much so that some physicians desire a specimen to be set aside for the use of one patient. Physiological standardisation affords the best guarantee that the preparation is active. Idiosyncrasy to the action of the extract is marked, so that small initial doses are recommended. The extract is prescribed in pills and is used in the preparation of the tincture. Pills may be prepared by massing the extract with powdered liquorice, adding a little alcohol if necessary.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

NOTE.—*Fluidextractum Cannabis Indicæ*, U.S.P., is prepared by exhausting Indian hemp, in No. 30 powder, with 95 per cent. alcohol.

## EXTRACTUM CAPSICI LIQUIDUM.

LIQUID EXTRACT OF CAPSICUM.

Capsicum Fruit, in No. 60 powder ... .. 200·00  
Alcohol, a sufficient quantity.

Exhaust the drug by percolation, and distil off the alcohol until the residual extract weighs 100.

This extract requires dilution with 6 to 10 parts of alcohol for external use, as a rubefacient; 10 per cent. of castor oil or oleic acid may be added to reduce irritation.

NOTE.—*Fluidextractum Capsici*, U.S.P., is half the strength of this extract.

## EXTRACTUM CASCARÆ SAGRADÆ.

EXTRACT OF CASCARA SAGRADA.

*Synonym.*—*Extractum Rhamni Purshianæ*.

Cascara Sagrada, in No. 20 powder ... .. 100·00  
Distilled Water, a sufficient quantity.

Moisten the drug with the water and set aside for a few hours; then pack loosely in a percolator, exhaust by percolation with more water, and evaporate to dryness on a water-bath.



This extract may be made into pills with dilute alcohol, adding a trace of acacia powder. For inclosure in gelatin capsules, it should be finely powdered and mixed into a soft mass with liquid paraffin. The extract is largely used in tablet form (see *Tabletæ Cascaræ Sagradæ*), and is commonly prescribed with the extracts of belladonna and nux vomica, or with aloin and euonymin.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

*NOTE.*—*Extractum Rhamni Purshianæ*, U.S.P., is a powder, prepared by exhausting the drug, in No. 60 powder, with 12 per cent. alcohol, evaporating the liquid to dryness, and adding sufficient powdered liquorice to make the weight of product equal one-fourth that of the original drug.

## EXTRACTUM CASCARÆ SAGRADÆ LIQUIDUM.

LIQUID EXTRACT OF CASCARA SAGRADA.

*Synonym.*—*Extractum Rhamni Purshianæ Liquidum*.

Cascara Sagrada, in No. 20 powder ... 100·00

Alcohol ... 20·00

Distilled Water, sufficient to produce ... 100·00

Moisten the drug with 75 of the water, set the mixture aside for six hours, then exhaust by percolation with distilled water; evaporate the resulting percolate to 60, and add the alcohol, previously mixed with an equal volume of water, or sufficient to produce 100.

Liquid extract of cascara is incompatible with acids and with strong solutions of mineral salts. It is miscible with alkalies, especially with aromatic spirit of ammonia; such mixtures gradually lose their bitter taste. Liquid extract of cascara mixes well with glycerin, and is frequently prescribed therewith, the extract being thus rendered more readily miscible. Flavoured liquid preparations of cascara are *Syrupus Cascaræ Aromaticus* and *Elixir Cascaræ*; these may be specially prepared for children with the tasteless extract. The extract can also be dispensed in capsules.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES.*—It has been stated that a more readily miscible preparation (*Extractum Cascaræ Sagradæ Miscibile*) can be obtained by replacing the alcohol in the above formula with twice its volume of glycerin, and adding 1 per cent. of strong solution of ammonia after filtration. *Extractum Cascaræ Sagradæ Liquidum*, B.P., 1885, was prepared by boiling 100 of the coarsely powdered bark with three or four successive portions of distilled water until exhausted, evaporating the strained liquors over a water-bath to 75, and, when cold, adding 25 of rectified spirit; the mixture was then set aside for some hours, filtered, and sufficient distilled water added to produce 100 by volume. *Fluidextractum Rhamni Purshianæ*, U.S.P., is prepared by exhausting cascara sagrada, in No. 40 powder, with 95 per cent. alcohol mixed with one and a-half times its volume of water.

## EXTRACTUM CASCARÆ SAGRADÆ LIQUIDUM INSIPIDUM.

TASTELESS LIQUID EXTRACT OF CASCARA SAGRADA.

Liquid Extract of Cascara Sagrada ... 95·00

*an. Hydrate Solution of Potash* ... 5·00

Heat the liquid extract with the alkali in a vessel provided with

a reflux condenser, on a water-bath, for three hours, or until the bitterness has disappeared.

Tasteless extract of cascara may be used in the preparation of Elixir Cascara and of Syrupus Cascaræ Aromaticus if specially ordered so. For children, where the alcohol or the bitterness of the orange is objectionable, a syrup may be prepared containing with 4 parts of simple syrup 1 part each of glycerin and of tasteless fluid extract of cascara.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation is an improvement upon, and more active than, tasteless extracts of cascara, which are made by mixing lime or magnesia with the powdered bark before percolation.

### EXTRACTUM CAULOPHYLLI LIQUIDUM.

LIQUID EXTRACT OF CAULOPHYLLUM.

*Synonym.*—Liquid Extract of Blue Cohosh.

Caulophyllum, in No. 60 powder	...	...	100·00
Alcohol (60 per cent.), sufficient to produce	...	...	100·00

Exhaust the drug by percolation, reserving the first 85 of percolate. Recover most of the alcohol from the subsequent percolate by distillation, evaporate the residue to a soft extract, dissolve this in the reserved percolate, and add sufficient of the alcohol to make up the required volume.

Liquid extract of caulophyllum is used with the tinctures of pulsatilla and viburnum or with the liquid extracts of aletris and hydrastis as a uterine sedative and tonic.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims).

### EXTRACTUM CIMICIFUGÆ LIQUIDUM.

LIQUID EXTRACT OF CIMICIFUGA.

*Synonym.*—Liquid Extract of Actæa Racemosa.

Cimicifuga, in No. 60 powder...	...	...	100·00
Alcohol, sufficient to produce	...	...	100·00

Macerate the drug with 200 of alcohol for forty-eight hours, then transfer to a percolator, and percolate with sufficient alcohol to exhaust the drug. Reserve the first 75 of percolate; evaporate the remainder to a soft extract, dissolve this in the reserved portion, and add sufficient alcohol to make up the required volume.

Liquid extract of cimicifuga is used in place of the tincture in rheumatism, lumbago, and for its supposed action on the uterus, in dysmenorrhœa.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

*NOTES.*—This preparation corresponds to Fluidextractum Cimicifugæ, U.S.P. Extractum Cimicifugæ, U.S.P., is a fine powder, prepared by evaporating 400 of the liquid extract to dryness, powdering the residue, and adding sufficient liquorice root, in No. 80 powder, to produce 100 by weight. Dose, 1 to 5 decigrams (2 to 8 grains).

**EXTRACTUM CINCHONÆ LIQUIDUM.**

LIQUID EXTRACT OF CINCHONA.

*Synonym.*—Liquor Cinchonæ.

Red Cinchona Bark, in No. 60 powder	...	128·00
Hydrochloric Acid	... ..	4·00
Glycerin	... ..	16·00
Alcohol, a sufficient quantity.		
Distilled Water, a sufficient quantity.		

Add the hydrochloric acid and glycerin to 640 of the water, mix the drug with the resulting liquid, and allow it to macerate for forty-eight hours with frequent agitation; then transfer the mixture to a percolator and continue the percolation with water until the percolate measures 1920, or ceases to give a precipitate when an excess of solution of potassium hydroxide is added. Place the resulting percolate in a porcelain or enamelled iron vessel, and reduce by evaporation to 128, at a temperature not exceeding 82°; then standardise, and adjust so that the finished product shall contain 5 per cent. of alkaloids and 12·5 per cent. of alcohol.

Liquid extract of cinchona is used as a bitter or mild astringent. It is incompatible with alkalis, alkaline carbonates (slight effervescence), with iodides and salicylates, though they are frequently prescribed together. In dispensing such mixtures the liquid extract should be mixed with any syrup or glycerin ordered, and poured into some of the aqueous vehicle containing a little mucilage, the salts being subsequently added in as dilute a solution as possible. If the liquid extract be poured into a solution of the salts, a lumpy and unsightly mixture will result. The extract should preferably be prescribed with an acid medium; with dilute phosphoric acid and syrup of lemon it forms a pleasant and presentable mixture.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—Fluidextractum Cinchonæ, U.S.P., is prepared by exhausting cinchona, in No. 60 powder, with alcohol, glycerin, and water, and should contain 4 per cent. w/v of anhydrous ether-soluble alkaloids from cinchona.

**EXTRACTUM CISSAMPELI LIQUIDUM.**

LIQUID EXTRACT OF CISSAMPELOS.

Cissampelos, in No. 40 powder	... ..	100·00
Distilled Water, boiling, a sufficient quantity.		
Alcohol, a sufficient quantity.		

Mix the drug with about 120 of the boiling water, allow to macerate for twenty-four hours, then pack in a percolator, and percolate with boiling water till exhausted. Determine the proportion of extractive matter in the percolate, evaporate the latter until it contains one-third its weight of extractive, and add sufficient alcohol to increase the volume of product by one-third, afterwards filtering if necessary.

Liquid extract of cissampelos has similar properties to liquid extract of pareira.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).



NOTE.—Liquid extract of cissampelos is official in India and the Eastern Colonies, where the proportion of alcohol may be increased to one-fourth by weight of the finished product in order to prevent fermentation.

### EXTRACTUM COCÆ LIQUIDUM.

#### LIQUID EXTRACT OF COCA.

Coca Leaves, in No. 20 powder	... ..	100·00
Alcohol (60 per cent.), sufficient to produce	...	100·00

Macerate the drug with 200 of alcohol for forty-eight hours, then transfer the mixture to a percolator, and percolate with sufficient alcohol to exhaust the drug. Reserve the first 75 of percolate; evaporate the remainder, at a temperature below 80°, to a soft extract, dissolve this in the reserved portion, and add sufficient alcohol to make up the required volume.

Liquid extract of coca is prescribed in mixture form or diluted with glycerin and syrup. It forms a turbid mixture with water, its waxy constituents being precipitated. Miscible liquid extract of coca is without this disadvantage. The content of total alkaloid in liquid extract of coca is very variable, ranging from 0·2 to 0·8 per cent., the average being about 0·38 per cent. This uncertainty in its composition causes the preparation to be little used.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—Fluidextractum Cocæ, U.S.P., is prepared by exhausting coca leaves, in No. 40 powder, with 49 per cent. alcohol, and should contain 0·5 per cent. w/v of ether-soluble alkaloids of coca.

### EXTRACTUM COCÆ LIQUIDUM MISCIBILE.

#### MISCIBLE LIQUID EXTRACT OF COCA.

Coca Leaves, in No. 20 powder	... ..	100·00
Alcohol (60 per cent.), sufficient to produce	...	100·00

Exhaust the drug by percolation with the alcohol, concentrate the percolate to 50 by evaporation, pour off as much clear liquid from the residue as possible, wash the residue with 10 of water, mix the washings with the clear liquid, and add sufficient of the alcohol to make up the required volume.

Miscible liquid extract of coca is free from the wax of the official liquid extract and forms a clear solution with water. It is usually weaker in total alkaloid than the official liquid extract. Elixir of coca is a pleasant preparation of the miscible extract.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### EXTRACTUM COLCHICI.

#### EXTRACT OF COLCHICUM.

Colchicum Corms, fresh	... ..	100·00
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Express the juice from the crushed corms, after removing their coats, and allow it to stand till clear; then decant, heat the clear liquid to 100°, strain through flannel, and evaporate to a soft extract, at a temperature not exceeding 71°.

Extract of colchicum is prescribed in pills to relieve the pain and

inflammation of acute gout. It is frequently combined with blue pill or compound colocynth pill, or with Dover's powder. It is a constituent of some proprietary gout and rheumatic pills.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

### EXTRACTUM COLCHICI ACETICUM.

ACETIC EXTRACT OF COLCHICUM.

*Synonym.*—Extractum Colchici Cormi.

Colchicum Corms, fresh...	...	...	...	95°00
Acetic Acid	...	...	...	5°00

Express the juice from the crushed corms, after removing their coats, add the acid, and allow to stand till clear; then decant, heat the clear liquid to 100°, strain through flannel, and evaporate to a soft extract at a temperature not exceeding 71°.

This extract is preferred to the simple extract by some practitioners. It is used similarly to Extractum Colchici, but is rather weaker in colchicine, owing to the greater amount of extractive matter dissolved by the acetic acid.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

NOTES.—Extractum Colchici Aceticum was official in the British Pharmacopœia, 1885. Extractum Colchici Cormi, U.S.P., is prepared by exhausting 100 of colchicum corm in No. 60 powder by percolation with 35 of acetic acid and a sufficient quantity of water, evaporating the percolate to a pilular consistence, and adjusting the strength of the extract so that it shall contain 1·4 per cent. of colchicine.

### EXTRACTUM COLOCYNTHIDIS COMPOSITUM.

COMPOUND EXTRACT OF COLOCYNTH.

Colocynth Pulp...	...	...	...	30°00
Extract of Barbados Aloes	...	...	...	60°00
Scammony Resin	...	...	...	20°00
Curd Soap, in shavings	...	...	...	20°00
Cardamom Seeds, in very fine powder	...	...	...	5°00
Alcohol (60 per cent.)	...	...	...	800°00

Prepare a tincture of colocynth by macerating the drug with the alcohol for four days; then remove the alcohol by evaporation, add the extract, resin and soap, and evaporate the mixture to a firm extract, adding the cardamoms near the end of the operation.

Compound extract of colocynth is commonly kept for dispensing purposes in the form of powder, 5 parts of powder approximately representing 6 parts of mass. It is usually prescribed with extract of henbane or extract of belladonna to prevent griping; it forms with calomel or blue pill the basis of most "antibilious pills." The powdered extract is best massed with a trace of diluted alcohol.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

NOTE.—Extractum Colocynthidis Compositum, U.S.P., is prepared by mixing 16 of extract of colocynth, 50 of purified aloes, 14 of resin of scammony, 14 of hard soap, and 10 of alcohol (95 per cent.), heating the mixture at a temperature not exceeding 120° until it is homogeneous, then adding 6 of powdered cardamoms, and reducing the product to a fine powder when cold. Average dose, 5 decigrams ( $7\frac{1}{2}$  grains).

**EXTRACTUM CONDURANGO LIQUIDUM.**

LIQUID EXTRACT OF CONDURANGO.

Condurango Bark, in No. 60 powder... 100·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Exhaust the drug by percolation with the alcohol. Reserve the first 85 of percolate, concentrate the subsequent percolate to a soft extract, dissolve this in the reserved portion, and add sufficient of the alcohol to make up the required volume.

Liquid extract of condurango is often prescribed in mixtures with other "alteratives" such as potassium iodide and perchloride of mercury. For its gastric sedative action it may be mixed with bitters and taken half an hour before a meal.

*Dose.*— $\frac{1}{2}$  to 4 mils (10 to 60 minims).

**EXTRACTUM CONII.**

EXTRACT OF CONIUM.

*Synonym.*—Extract of Hemlock.

Conium Leaves... 100·00

Press out the juice from the bruised leaves, heat it to 54°, and strain through calico to remove the chlorophyll. Heat the strained liquor to 93°, remove the coagulated albumen by filtration, evaporate the filtrate to a thin syrup by the heat of a water-bath, add the previously separated chlorophyll, after passing it through a hair sieve, stir, and evaporate to a soft extract at a temperature not exceeding 60°.

The alkaloidal content of this extract varies considerably, averaging about 0·4 per cent. It is used as a mild sedative and antispasmodic in pill form (see *Pilula Conii Composita*), and in suppositories (30 centigrams, 5 grains in each) in place of *Extractum Belladonnæ*.

*Dose.*— $\frac{1}{2}$  to 2 $\frac{1}{2}$  decigrams (1 to 4 grains).

*NOTE.*—*Extractum Conii* was official in the British Pharmacopœia, 1885.

**EXTRACTUM CONII LIQUIDUM.**

LIQUID EXTRACT OF CONIUM.

*Synonym.*—Liquid Extract of Hemlock.

Conium Fruit, in No. 40 powder ... 100·00

Acetic Acid ... 1·25

Alcohol (60 per cent.), a sufficient quantity.

Mix the acetic acid with 100 of the alcohol, moisten the powder with 30 of the mixture, pack in a percolator, and percolate with the remainder of the menstruum. Continue the percolation with the alcohol until exhaustion is complete. Reserve the first 85 of percolate, concentrate the subsequent percolate to a soft extract, dissolve this in the reserved percolate, and add sufficient of the



alcohol to make up the required volume. Determine the proportion of alkaloids in the strong liquid extract, and adjust the finished product so that it shall contain alkaloids equivalent to 1 per cent. of alkaloidal hydrochlorides.

*Conioides*  
Liquid extract of conium, being standardised to contain 1 per cent. of total alkaloids, is the most uniform preparation of hemlock. It may be used with advantage in place of the tincture and juice of conium; 1 fluid ounce (30 mls) of the latter is about equal to 1 fluid drachm (4 mls) of the liquid extract.

*Dose.*—3 to 10 decimils (5 to 15 minims).

NOTE.—Fluidextractum Conii, U.S.P., is prepared by exhausting 100 of conium in No. 40 powder with 2 of acetic acid (36 per cent.) and sufficient alcohol (49 per cent.) to produce a liquid containing 0.45 per cent. w/v of coniine.

### EXTRACTUM CONVALLARIÆ.

#### EXTRACT OF CONVALLARIA.

Convallaria Flowers, in No. 20 powder ... 100.00  
Distilled Water, a sufficient quantity.

Moisten the drug with the water and set aside for a few hours; then pack loosely in a percolator, exhaust by percolation with more water, and evaporate to dryness on a water-bath.

Extract of convallaria is best given in the form of pills containing 6 centigrams (1 grain), being mixed with an equal weight of powdered convallaria flowers and massed with syrup of glucose.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

### EXTRACTUM CONVALLARIÆ LIQUIDUM.

#### LIQUID EXTRACT OF CONVALLARIA.

Convallaria Flowers, in No. 60 powder ... 100.00  
Alcohol (60 per cent.), sufficient to produce ... 100.00

Exhaust the drug by percolation with the alcohol, reserving the first 85 of percolate. Recover most of the alcohol from the subsequent percolate by distillation, evaporate the residue at a temperature below 80° to a soft extract, dissolve this in the reserved percolate and add sufficient of the alcohol to make up the required volume.

Liquid extract of convallaria may be prescribed in mixtures when a stronger preparation than the tincture is required.

*Dose.*—3 to 6 decimils (5 to 10 minims).

NOTE.—Fluidextractum Convallariæ, U.S.P., is prepared from the dried rhizome and roots of *Convallaria majalis*, Linn.

### EXTRACTUM CUBEÆ LIQUIDUM.

#### LIQUID EXTRACT OF CUBEBS.

Cubebs, in No. 40 powder ... 100.00  
Alcohol, sufficient to produce ... 100.00

Exhaust the drug by percolation with the alcohol. Reserve the first 80 of percolate, concentrate the subsequent percolate to a soft

extract, dissolve this in the reserved portion, and add sufficient alcohol to make up the required volume.

Liquid extract of cubebs is a more concentrated solution of the active principles of the drug than the tincture, and is consequently preferred to the latter when the larger bulk of alcohol is objectionable.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

*NOTE.*—This preparation corresponds to Fluidextractum Cubebæ, U.S.P

## EXTRACTUM DAMIANÆ.

### EXTRACT OF DAMIANA.

Liquid Extract of Damiana ... .. 100·00

Evaporate the liquid until a soft extract is obtained.

Extract of damiana is prescribed in pill form generally with nervine tonics and aphrodisiacs, as in the case of Pilula Damianæ Composita.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

## EXTRACTUM DAMIANÆ LIQUIDUM.

### LIQUID EXTRACT OF DAMIANA.

Damiana, in No. 60 powder ... .. 100·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Exhaust the drug by percolation with the alcohol. Reserve the first 85 of percolate, concentrate the subsequent percolate to a soft extract, dissolve this in the reserved portion, and add sufficient menstruum to make up the required volume.

Liquid extract of damiana is prescribed in mixtures with quinine and nux vomica, or as a syrup with the glycerophosphates or hypophosphites.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## EXTRACTUM ERGOTÆ.

### EXTRACT OF ERGOT.

*Synonym.*—Ergotin.

Ergot, in No. 40 powder ... .. 100·00

Diluted Hydrochloric Acid ... .. 4·70

Sodium Carbonate ... .. 2·00

Alcohol (60 per cent.), a sufficient quantity.

Distilled Water, a sufficient quantity.

Add 50 of the alcohol to the powdered drug, pack in a percolator, exhaust by percolation with more alcohol, and evaporate the percolate to 25; then dilute the liquid with an equal volume of distilled water, cool, and filter, washing the residue with a little water. To the filtrate add the acid and set aside for twenty-four hours, then filter, wash the residue with water until the washings cease to give

an acid reaction, and add the washings to the filtrate; finally add the sodium carbonate, and evaporate to a soft extract.

This preparation tends to produce a mild but prolonged ergot effect, and is preferred to Bonjean's ergotin, which is prepared by exhausting the drug with water, and purifying with alcohol before evaporating. Extract of ergot is commonly given in pills, stiffened with a little powdered liquorice or althæa. If prescribed with other soft extracts, the mass may be evaporated over a water-bath. Capsules of extract of ergot are prepared containing usually 18 centigrams (3 grains in each). Extract of ergot is used in the preparation of solutions for hypodermic use (see *Injectio Ergotæ Hypodermica*). This extract is preferred by some practitioners to *Extractum Ergotæ Liquidum*, and for use in the form of mixture it may be dissolved in water with a little glycerin, and spirit of chloroform added as a flavouring and preservative agent. When ordered in capsules, ergotin should be evaporated to about three-fourths its bulk, and then made up to its original volume by the addition of soft paraffin.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

NOTE.—*Extractum Ergotæ*, U.S.P., is prepared in a similar way, with 100 of ergot, 5 of diluted hydrochloric acid, 0.85 of sodium carbonate, 1.25 of glycerin, and sufficient quantities of alcohol and water.

### EXTRACTUM ERGOTÆ AMMONIATUM LIQUIDUM.

AMMONIATED LIQUID EXTRACT OF ERGOT.

Ergot, in No. 20 powder	...	...	...	100.00
Solution of Ammonia	...	...	...	10.00
Alcohol (60 per cent.), a sufficient quantity.				

Mix the solution of ammonia with 70 of the alcohol, and moisten the ergot with 40 of the mixture. Pack in a percolator, and percolate with the remainder of the menstruum. Continue the percolation with the alcohol until exhaustion is complete. Reserve the first 85 of percolate, evaporate the weak percolates to 15, and add to the reserved portion.

This preparation is about four times the strength of the official ammoniated tincture of ergot; it is not, however, very active, and there is reason to believe that the ammonia destroys the active principle of the drug slowly. Ammoniated preparations of ergot should not be prescribed with salts of iron.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims).

### EXTRACTUM ERGOTÆ LIQUIDUM.

LIQUID EXTRACT OF ERGOT.

*Synonym.*—*Liquor Ergotæ*.

Ergot, crushed	...	...	...	...	100.00
Distilled Water	...	...	...	...	750.00
Alcohol	...	...	...	...	37.50

Mix the drug with 500 of the water, allow to digest for twelve hours, remove the liquid, and repeat the process with the rest of



the water; then press, strain the mixed liquid, evaporate to 70, cool, add the alcohol, set aside for an hour, and filter. The product should measure 100.

The liquid extract of ergot is the most commonly used, though it is perhaps not the most active or permanent, preparation of ergot. When it is prescribed with ferric chloride, a few grains of citric acid should also be prescribed to avoid precipitation. The nauseous taste of ergot may be covered with tincture of orange and spirit of chloroform or cinnamon water.

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims).

*NOTES.*—It has been suggested that this extract should be made by percolation instead of maceration. Fluidextractum Ergotæ, U.S.P., is prepared by exhausting 100 of recently ground ergot, in No. 60 powder, with 2 of acetic acid (36 per cent.), and sufficient 49 per cent. alcohol to produce 100 by volume.

### EXTRACTUM EUCALYPTI GUMMI LIQUIDUM.

LIQUID EXTRACT OF EUCALYPTUS GUM.

*Synonyms.*—Extractum Gummi Rubri Liquidum; Liquid Extract of Red Gum.

Eucalyptus Gum	...	...	...	...	25'00
Alcohol	...	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the eucalyptus gum in 65 of the distilled water, strain, and add the alcohol with sufficient distilled water to make up the required volume.

Liquid extract of eucalyptus gum is used as a styptic, applied to wounds on lint or injected into the nose for epistaxis. It is diluted with 16 parts of water to form a gargle, or with 40 parts of water for an astringent injection.

*Dose.*—2 to 4 mls (30 to 60 minims).

### EXTRACTUM EUONYMI. Siccum.

EXTRACT OF EUONYMUS.

*Synonyms.*—Euonymin; Brown Euonymin; Extractum Euonymi Siccum.

Euonymus Bark, in No. 20 powder	...	...	100'00
Alcohol (45 per cent.), a sufficient quantity.			
Calcium Phosphate, a sufficient quantity.			

Add 50 of the alcohol to the drug, pack in a percolator, exhaust by percolation with more of the alcohol, and evaporate the percolate to dryness; powder the residue, mix the product with one-fourth its weight of calcium phosphate, dry, powder, and preserve in a well-stoppered bottle.

Extract of euonymus is a brown powder. The substance known commercially as euonymin is of very indefinite nature, being prepared from the bark of *Euonymus atropurpureus* in various ways. The name has been applied to the mixture of substances precipitated on pouring a concentrated alcoholic tincture into a large volume of

water as well as to *Extractum Euonymi Siccum*. Euonymin prepared by the former process is known as "green euonymin," because of the presence of chlorophyll, while the official preparation is known as "brown euonymin." Substances other than calcium phosphate are sometimes added as absorbents or diluents, *e.g.*, milk sugar, alumina, lycopodium, etc. The ash of such preparations may therefore vary from 1 or 2 per cent. to as much as 53 per cent. In any case the commercial preparation is not to be confounded with the nearly colourless, bitter principle of the same name. Extract of euonymus must be carefully stored in a cool and dry place, or it will absorb moisture and become coherent. It is prescribed in pill form often with extract of henbane, extract of cascara, iridin, or extract of *nux vomica* for the treatment of constipation with pale stools.

*Dose*.—6 to 12 centigrams (1 to 2 grains).

NOTES.—*Extractum Euonymi*, U.S.P., is prepared by evaporating 100 of *Fluidextractum Euonymi* to dryness, and mixing the finely-powdered residue with sufficient powdered liquorice to make the product weigh 25. *Fluidextractum Euonymi*, U.S.P., is prepared by exhausting euonymus, in No. 40 powder, with 76 per cent. alcohol.

## EXTRACTUM FILICIS LIQUIDUM.

LIQUID EXTRACT OF MALE FERN.

*Synonyms*.—*Oleoresina Aspidii* ; Male Fern *Oleoresin*.

Male Fern Rhizome, in No. 20 powder ... 100·00

Ether, a sufficient quantity.

Exhaust the drug by percolation with the ether, and remove the solvent from the clear percolate by distillation or evaporation on a water-bath, until the extract acquires an oily consistence.

This extract is used entirely for the expulsion of tape worms and ankylostoma. Given a case of *tania solium* the best plan to adopt is to give from 4 to 6 drachms of magnesium sulphate late at night. A few hours after purgation a dose of the liquid extract (not less than 20 minims) should be given. About four hours later this should be followed by a full dose of castor oil. The extract may be prescribed in gelatin capsules containing from 6 to 18 decimils (10 to 30 minims) in each. It may also be given in milk, but is more frequently dispensed as an emulsion. It can be emulsified with half its volume of tincture of quillaia, one-sixth its volume of tincture of senega, an equal weight of powdered acacia, or half its weight of compound tragacanth powder. Thus, a draught may be prepared by mixing 4 mls (1 fluid drachm) of the liquid extract with an equal volume of syrup of ginger, half its volume of tincture of senega, and sufficient distilled water to produce 45 mls (1½ fluid ounces); or 4 mls (1 fluid drachm) of the extract may be emulsified with 4 grammes (60 grains) of powdered acacia, and sufficient peppermint or chloroform water to produce 30 to 60 mls (2 fluid ounces).

*Dose*.—3 to 6 mls (45 to 90 minims).

NOTE.—*Oleoresina Aspidii*, U.S.P., is prepared by extraction with acetone.

**EXTRACTUM FUCI.**

EXTRACT OF BLADDER-WRACK.

Bladder-wrack, dried, in No. 20 powder ... 100·00

Alcohol (45 per cent.), a sufficient quantity.

Exhaust the drug by percolation with the alcohol, and concentrate the percolate to a firm extract.

This extract is given in pills massed with powdered liquorice or marshmallow root, to reduce glandular swellings, and in obesity.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

**EXTRACTUM FUCI LIQUIDUM.**

LIQUID EXTRACT OF BLADDER-WRACK.

Extract of Bladder-wrack ... 20·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Dissolve the extract in 80 of the alcohol, set aside for an hour, filter, and wash the residue on the filter with sufficient of the alcohol to make up the required volume.

This preparation is the basis of many nostrums advertised to cure obesity. Sodium and potassium iodides are often added to supplement the small proportion of iodine present.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

**EXTRACTUM GELSEMII.**

EXTRACT OF GELSEMIUM.

*Synonym.*—Extractum Gelsemii Alcoholicum.

Gelsemium Root, in No. 60 powder ... 100·00

Alcohol, a sufficient quantity.

Macerate the drug with 200 of alcohol for forty-eight hours, then transfer to a percolator and percolate with alcohol till exhausted. Recover most of the alcohol by distillation, and evaporate the residue to a mass of suitable consistence.

This extract may suitably replace the extractive “gelsemin,” the name of which renders it liable to be confused with the alkaloid gelsemine. Alcoholic extract of gelsemium is often prescribed in pills, with butyl-chloral hydrate or quinine.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

*NOTE.*—This extract was official in the British Pharmacopœia, 1885.

**EXTRACTUM GELSEMII LIQUIDUM.**

LIQUID EXTRACT OF GELSEMIUM.

Gelsemium, in No. 60 powder ... 100·00

Alcohol, sufficient to produce ... 100·00

Macerate the drug with 200 of alcohol for forty-eight hours, then transfer to a percolator, and percolate with alcohol till exhausted, reserving the first 75 of the percolate; recover most of the alcohol from the remainder of the percolate, evaporate the residue to a soft



extract, dissolve this in the reserved portion, and add sufficient alcohol to make up the required volume.

*Dose.*— $\frac{1}{2}$  to 3 decimils (1 to 5 minims).

*NOTE.*—This preparation corresponds to Fluidextractum Gelsemii, U.S.P.

### EXTRACTUM GENTIANÆ.

#### EXTRACT OF GENTIAN.

Gentian Root ... .. 100·00

Distilled Water, a sufficient quantity.

Add the drug to ten times its weight of the water, and infuse for two hours; then boil for fifteen minutes, decant, press, strain, and evaporate the liquid to a soft extract.

Extract of gentian is sometimes used as a pill excipient, alone or mixed with an equal weight of liquid glucose. It has in some degree the bitter properties of the root, but the process used does not extract all the bitter principles.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

*NOTE.*—Extractum Gentianæ, U.S.P., is prepared by exhausting gentian, in No. 20 powder, with water, by maceration and percolation, and evaporating the percolate to a pilular consistence. Fluidextractum Gentianæ, U.S.P., is prepared by exhausting gentian, in No. 30 powder, with 49 per cent. alcohol.

### EXTRACTUM GLYCYRRHIZÆ.

#### EXTRACT OF LIQUORICE.

*Synonym.*—Extract of Glycyrrhiza.

Liquorice Root, in No. 20 powder ... .. 100·00

Distilled Water... .. 500·00

Add the drug to 250 of the water, set aside for twenty-four hours, then strain and press; repeat the process with the same quantity of water, but set aside for six hours only. Finally mix the liquids, heat the mixture to 100°, strain through flannel, and evaporate to a soft extract.

Extract of liquorice is used in pills, and when excess of moisture is removed by evaporation, as "liquorice pellets," with or without menthol. These are sucked slowly for catarrhal colds. Extract of liquorice is also made into lozenges and pastilles of various forms, especially with aniseed or ammonium chloride. "Salmiak" tablets are an esteemed Continental remedy, composed of ammonium chloride and liquorice. Extract of liquorice is sometimes ordered as a constituent of fluid medicines. It should be rubbed in a mortar with a little warm water to procure solution. For incompatibles see Extractum Glycyrrhizæ Liquidum. The commercial extract sold simply as "liquorice" in flattened rolls or sticks contains a variable proportion (10 to 40 per cent.) of insoluble matter.

*NOTES.*—Extractum Glycyrrhizæ, U.S.P., is the ordinary commercial extract in flattened rolls. Extractum Glycyrrhizæ Purum, U.S.P., is prepared by macerating and percolating 100 of liquorice root, in No. 20 powder, with 15 of solution of ammonia (10 per cent.) diluted with 300 of water, continuing the percolation with water until the drug is exhausted, evaporating the percolate to a pilular consistence, and incorporating with the mass, while still warm, 5 per cent. by weight of glycerin. Average dose, 1 gramme (15 grains).

**EXTRACTUM GLYCYRRHIZÆ LIQUIDUM.**

LIQUID EXTRACT OF LIQUORICE.

Liquorice Root, in No. 20 powder	...	...	100'00
Distilled Water...	...	...	500'00
Alcohol, a sufficient quantity.			

Proceed as in the case of Extractum Glycyrrhizæ, but stop the evaporation when the strained liquid, after cooling, has a specific gravity of 1·20; add to the liquid one-fourth its volume of alcohol, and filter after standing for twelve hours.

Liquid extract of liquorice is used for its expectorant and demulcent properties in catarrhal conditions, and as a flavouring agent (for those who do not object to its sweetness) to disguise the taste of ammonium chloride, aloes, the iodides, quinine, etc. It is compatible with alkalies, but incompatible with acids. The deposit often found in the liquid extract is due to the formation of acid as a result of fermentation, by which a portion of the glycyrrhizin is precipitated. Not only are acid mixtures of the liquid extract very unsightly, but in such combinations the flavour of the liquorice is to a great extent lost. Strong solutions of sodium or magnesium sulphate precipitate liquid extract of liquorice, as do acid solutions of quinine. Solutions of the neutral soluble salts of quinine make less unsightly mixtures with the liquid extract, and the bitterness is well covered. Liquorice is a suitable flavouring agent for liquid extract of cascara.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Fluidextractum Glycyrrhizæ, U.S.P., is prepared by exhausting 100 of liquorice root, in No. 20 powder, by percolation with boiling water, evaporating the percolate to 45, cooling, adding 45 of alcohol (95 per cent.), setting aside for three days, then filtering, distilling until the distillate measures 50, and adding to the residue 25 of glycerin, 5 of solution of ammonia (10 per cent.), 20 of alcohol (95 per cent.), and sufficient water to produce 100.

**EXTRACTUM GLYCYRRHIZÆ SPIRITUOSUM.**

SPIRITUOUS EXTRACT OF LIQUORICE.

*Synonym.*—Alcoholic Extract of Liquorice.

Extract of Liquorice	...	...	...	50'00
Alcohol	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	100'00

Mix the extract with sufficient of the distilled water to dissolve it, and add the alcohol; then make up the required volume with distilled water, stirring constantly, and filtering if necessary.

Spirituous extract of liquorice is official in India and the Eastern Colonies, where the proportion of alcohol may be increased to one-fourth by weight of the finished product, in order to prevent fermentation.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**EXTRACTUM GOSSYPII LIQUIDUM.**

## LIQUID EXTRACT OF COTTON ROOT BARK.

*Synonym.*—*Extractum Gossypii Radicis Corticis Liquidum.*

Cotton Root Bark, in No. 30 powder	...	...	100'00
Glycerin ... ..	...	...	25'00
Alcohol, sufficient to produce	...	...	100'00

Add 75 of the alcohol to the glycerin, moisten the drug with 50 of the mixture, pack in a percolator, saturate with the menstruum, and allow to stand for forty-eight hours; then exhaust by percolation, first with the remainder of the menstruum, and then with alcohol. Reserve the first 70 of percolate, concentrate the remainder to a soft extract, dissolve this in the reserved portion, and make up the required volume with alcohol.

Liquid extract of cotton root bark is official in India, and in the Eastern, North American, and West Indian Colonies.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**EXTRACTUM GRINDELIAE LIQUIDUM.**

## LIQUID EXTRACT OF GRINDELIA.

Grindelia, in No. 40 powder	...	...	100'00
Sodium Bicarbonate	...	...	10'00
Distilled Water...	...	...	50'00
Alcohol, sufficient to produce	...	...	100'00

Add 40 of the alcohol to the drug, allow to macerate for twenty-four hours, pack in a percolator, saturate with alcohol, and set aside for twenty-four hours; then exhaust by percolation, recover the alcohol, dissolve the residue in the water mixed with the sodium bicarbonate to neutralise acid resin, add water sufficient to make 75, and make up the required volume with alcohol.

Liquid extract of grindelia is official in the Australasian and North American Colonies, where the proportion of alcohol may be increased to one-fourth by weight if necessary. The extract is prescribed in mixtures for its expectorant and anti-asthmatic properties, the mixtures containing one-sixteenth their volume of mucilage to prevent separation of resinous substances. The extract is incompatible with acids. Its nauseous taste may be covered with spirit of chloroform, glycerin, or liquid extract of liquorice.

*Dose.*—5 to 12 decimils (10 to 20 minims).

*NOTE.*—Fluidextractum Grindeliae, U.S.P., is prepared by exhausting grindelia with 71 per cent. alcohol. Extract of grindelia can be obtained of pilular consistence (*Extractum Grindeliae*) by exhausting the drug with 90 per cent. alcohol, recovering the alcohol, and evaporating. *Dose*,  $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

**EXTRACTUM HÆMATOXYLI.**

## EXTRACT OF LOGWOOD.

Logwood, in fine chips	...	...	100'00
Distilled Water, boiling	...	...	1000'00



Add the logwood to the water and infuse for twenty-four hours then evaporate to one-half by boiling, strain, and evaporate to dryness on a water-bath, stirring with a wooden spatula. Iron vessels should not be employed in the preparation of the extract.

Extract of logwood is sometimes prescribed in pills for its astringency. A little inert vegetable powder should be added to the extract, and the pills massed with syrup of glucose. They should not be made too hard or they will resist intestinal solution.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

NOTE.—Extractum Hæmatoxyli was official in the British Pharmacopœia, 1885, and corresponds to Extractum Hæmatoxyli (Extract of Hæmatoxylon), U.S.P.

## EXTRACTUM HÆMATOXYLI LIQUIDUM

LIQUID EXTRACT OF LOGWOOD.

*Synonym.*—Liquid Extract of Hæmatoxylon.

Logwood, in No. 20 powder	...	...	...	100·00
Alcohol	...	...	...	15·00
Distilled Water...	...	...	...	600·00

Boil the logwood with 200 of the water for half an hour, and strain. Repeat the process twice, and, having mixed the strained liquors, evaporate until the product measures 85. Add the alcohol, set aside for seven days, decant the clear liquor, and add sufficient distilled water to produce 100.

Liquid extract of logwood is an astringent suitable for use in mixtures against diarrhœa and some forms of hæmorrhage. It is sometimes combined with chalk mixture, aromatic confection, or the salts of bismuth.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

## EXTRACTUM HAMAMELIDIS.

EXTRACT OF HAMAMELIS.

*Synonyms.*—Extract of Witch Hazel; Hamamelin.

Hamamelis Bark, in No. 20 powder	...	100·00
Alcohol (45 per cent.), a sufficient quantity.		

Exhaust the drug by percolation with the alcohol, evaporate the percolate to dryness, and reduce the residue to a fine powder, which should be preserved in a well-stoppered bottle.

Extract of hamamelis is a dark brown powder, absorbing moisture on exposure to air. Suppositories are prepared for use against piles, containing in each 6 to 30 centigrams (1 to 5 grains) of the extract, often with extract of belladonna. The extract, in very fine powder, should be rubbed on a slab with a few drops of water and some of the melted fat added before mixing with the bulk of the melted fat. Extract of hamamelis is prescribed in pills, often with extract of ergot or extract of hydrastis.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

**EXTRACTUM HAMAMELIDIS LIQUIDUM.****LIQUID EXTRACT OF HAMAMELIS.***Synonym.*—Liquid Extract of Witch Hazel.

Hamamelis Leaves, in No. 40 powder ... 100·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Mix the drug with 40 of the alcohol, pack in a percolator, saturate the drug with alcohol, and allow to macerate for forty-eight hours; then exhaust by percolation with more alcohol. Reserve the first 85 of percolate; concentrate the subsequent percolate to a soft extract, dissolve this in the reserved percolate, and add sufficient of the alcohol to make up the required volume.

This is the most powerful preparation of hamamelis for internal administration or for local use. As an ointment for piles it is mixed with hydrous wool fat (see Unguentum Hamamelidis). For local application it may be diluted with 10 to 20 parts of water. Suppositories may be prepared containing 3 decimils (5 minims) in each. Internally it is given in mixture form, for its astringent action. It has no remote hæmostatic effect.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—Fluidextractum Hamamelidis Foliorum, U.S.P., is prepared with 32 per cent. alcohol, and contains 10 per cent. by volume of glycerin.

**EXTRACTUM HYDRASTIS.****EXTRACT OF HYDRASTIS.***Synonyms.*—Hydrastin; Extractum Hydrastis Siccum.

Hydrastis Rhizome, in No. 60 powder ... 100·00

Alcohol, a sufficient quantity.

Exhaust the drug by percolation with the alcohol, recover most of the alcohol by distillation, evaporate the residue to dryness, and transfer it immediately to a well-stoppered bottle.

This preparation should be prescribed as "Extractum Hydrastis," as the name "hydrastin" is liable to confusion with that of the alkaloid hydrastine. Extract of hydrastis is dispensed in pills, often with extract of ergot.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains);

*NOTE.*—It has been suggested that this extract should be standardised to contain 20 per cent. of total alkaloids, of which  $\frac{2}{3}$  should be hydrastine.

**EXTRACTUM HYDRASTIS LIQUIDUM.****LIQUID EXTRACT OF HYDRASTIS.**

Hydrastis Rhizome, in No. 60 powder ... 100·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Mix the drug with 40 of the alcohol; pack in a percolator, saturate the drug with alcohol, and allow to macerate for forty-eight hours; then exhaust by percolation with more alcohol. Reserve the first 85 of percolate; concentrate the subsequent percolate to a soft extract, dissolve this in the reserved percolate, and add sufficient of the alcohol to make up the required volume.

Liquid extract of *hydrastis* contains about 2 per cent. of the alkaloid *hydrastine*. It is prescribed in the form of mixture for internal use, or soft gelatin capsules may be prepared, some of the spirit being removed by evaporation. For external use the liquid extract is diluted with 20 parts of water for use as a lotion, gargle, or spray solution for the nose and throat. For urethral and vaginal injections a teaspoonful is added to half a pint of water.

*Dose*.—3 to 10 decimils (5 to 15 minims).

*NOTE*.—*Fluidextractum Hydrastis*, U.S.P., is prepared with 63 per cent. alcohol, contains 10 per cent. by volume of glycerin, and is standardised to contain 2 per cent. w/v of *hydrastine*.

## EXTRACTUM HYOSCYAMI EXSICCATUM.

DRIED EXTRACT OF HYOSCYAMUS.

*Synonyms*.—*Extractum Hyoscyami Folii Exsiccatum*; Dried Extract of *Hyoscyamus* Leaves.

*Hyoscyamus* Leaves and Flowering, Tops in

No. 20 powder	...	...	...	...	100·00
Alcohol (70 per cent.)	...	...	...	...	400·00

Exhaust the drug by repercolation with the alcohol. Assay the tincture thus obtained, recover the alcohol from the remainder by distillation, and dry the residue in a tared dish, first over a water-bath and finally in a hot air oven at a temperature between 60° and 70°, until the weight is fairly constant. Calculate the percentage of alkaloid in the dry extract, and incorporate with the latter a sufficient quantity of a standard powder of the leaves to produce an extract containing 0·2 per cent. of alkaloid. Triturate until thoroughly mixed, pass through a No. 20 sieve, and transfer to a well-stoppered bottle.

Dried extract of *hyoscyamus* leaves is an improvement upon the official green extract. It is constant in strength, and being in the form of powder is more convenient for dispensing.

*Dose*.—1 to 3 decigrams (2 to 5 grains).

*NOTE*.—Dried extract of *hyoscyamus* leaves should be kept in a cool, dry place.

## EXTRACTUM HYOSCYAMI VIRIDE.

GREEN EXTRACT OF HYOSCYAMUS.

*Hyoscyamus*, fresh ... .. 100·00

Express the juice from the bruised leaves, flowering tops, and young branches, and gradually heat to 54°; strain through calico to remove the chlorophyll, heat the strained liquid to 93°, and filter. Evaporate the filtrate to a thin syrup, add the chlorophyll after passing it through a hair sieve, mix, and evaporate to a soft extract at a temperature not exceeding 60°.

The alkaloidal strength of green extract of henbane varies from 0·15 to 0·45 per cent., the average strength being about 0·2 per cent. This extract is very commonly used in pills to allay the griping of



purgatives (as in *Pilula Colocynthis et Hyoscyami*), and for its sedative properties. It is occasionally ordered in suppositories, when the extract should be rubbed to a thin paste with a few drops of water before incorporating with the fat melted at a low temperature.

*Dose*.—1 to 5 decigrams (2 to 8 grains).

NOTE.—*Extractum Hyoscyami*, U.S.P., is prepared by evaporating *Fluidextractum Hyoscyami*—which is prepared by exhausting *hyoscyamus*, in No. 60 powder, with 63 per cent. alcohol, and contains 0.075 per cent. w/v of alkaloids—to a pilular consistence, and adjusting the strength by the addition of milk sugar, if necessary, so that the extract shall contain 0.3 per cent. of alkaloids. Average dose, 65 milligrams (1 grain).

## EXTRACTUM IPECACUANHÆ LIQUIDUM.

### LIQUID EXTRACT OF IPECACUANHA.

Ipecacuanha Root, in No. 20 powder	...	100.00
Calcium Hydroxide	... ..	10.00
Alcohol, a sufficient quantity.		

Add 37.5 of the alcohol to the powdered drug, pack firmly in a percolator, add more of the alcohol, and allow to macerate for twenty-four hours, then percolate till exhausted, reserving the first 84 of percolate. Add the lime to the marc, mix, set aside for twenty-four hours; and again exhaust by percolation. Mix the last two percolates, recover the alcohol from the mixture by distillation, and dissolve the residue in the reserved percolate, finally standardise, and adjust so that the finished product shall contain from 2 to 2.25 per cent. of alkaloids.

Liquid extract of *ipecacuanha* is used principally in the preparation of *Acetum Ipecacuanhæ* and *Vinum Ipecacuanhæ*; it is not very suitable for use in dispensing on account of its concentration, and because it deposits when mixed with aqueous or weak spirituous liquids. The latter objection may be obviated by the use of *Extractum Ipecacuanhæ Liquidum Miscibile*.

*Dose*.—As an expectorant, 3 to 12 centimils ( $\frac{1}{2}$  to 2 minims); as an emetic, 10 to 12 decimils (15 to 20 minims).

NOTE.—*Fluidextractum Ipecacuanhæ*, U.S.P., is prepared by exhausting *ipecacuanha*, in No. 80 powder, with 71 per cent. alcohol, and contains 1.75 per cent. w/v of alkaloids.

## EXTRACTUM IPECACUANHÆ MISCIBILE.

### MISCIBLE EXTRACT OF IPECACUANHA.

*Synonym*.—*Extractum Ipecacuanhæ Liquidum Miscibile*.

Liquid Extract of Ipecacuanha	...	100.00
Acetic Acid, a sufficient quantity.		
Distilled Water, sufficient to produce	...	100.00

Mix the liquid extract with an equal volume of the water, and allow to stand in a cool place for twenty-four hours; then filter, and wash the residue on the filter with a small quantity of distilled water

until colourless, keeping the washings separate. Next add to the filtrate sufficient acetic acid to give a very faintly acid reaction, and distil by the heat of a water-bath until the distillate contains the equivalent of 40 of absolute alcohol, and measures about 52·5. Reserve this portion of the distillate, continue the distillation to recover the remaining alcohol, and evaporate the residue on the water-bath to about 42·5 ~~fluid ounces~~. Allow to cool, pour off the bright liquid, and add it to the reserved distillate; then rinse the dish with the washings obtained in the first part of the process, add the washings to the mixed liquids, filter if necessary, and evaporate until the liquid extract measures 100. The finished product yields from 2 to 2·5 per cent. of alkaloids when assayed by the official process for *Extractum Ipecacuanhæ Liquidum*.

This extract forms a bright mixture with detannated sherry, and does not deposit readily when mixed with aqueous liquids.

*Dose*.—As an expectorant, 3 to 12 centimils ( $\frac{1}{2}$  to 2 minims); as an emetic, 10 to 12 decimils (15 to 20 minims).

## EXTRACTUM IRIDIS.

### EXTRACT OF IRIS.

*Synonyms*.—Iridin; *Extractum Iridis Siccum*.

Blue Flag Rhizome, in No. 60 powder ... 100·00

Alcohol (60 per cent.), a sufficient quantity.

Exhaust the drug by percolation with the alcohol, recover the alcohol by distillation, evaporate the residue to dryness, and reduce to a fine powder, which should be preserved in a well-stoppered bottle.

This extract is prescribed in pills with extract of henbane, sometimes with the addition of euonymin or other cholagogues. It is a cholagogue purgative used in the so-called "biliousness" due to intestinal fermentation.

*Dose*.— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

## EXTRACTUM JABORANDI.

### EXTRACT OF JABORANDI.

*Synonyms*.—*Extractum Pilocarpi*; Extract of Pilocarpus.

Jaborandi Leaves, in No. 40 powder ... 100·00

Alcohol (60 per cent.) ... 250·00

Exhaust the drug by percolation with the alcohol, and evaporate the percolate to a suitable consistence.

Extract of jaborandi is a suitable preparation of the drug for use in the form of pills.

*Dose*.—1 to 6 decigrams (2 to 10 grains).

NOTE.—*Extractum Jaborandi* was official in the British Pharmacopœia, 1885.

**EXTRACTUM JABORANDI LIQUIDUM.****LIQUID EXTRACT OF JABORANDI.**

*Synonyms.*—Extractum Pilocarpi Liquidum; Liquid Extract of Pilocarpus.

Jaborandi Leaves, in No. 20 powder ... .. 100·00

Alcohol (45 per cent.), sufficient to produce ... .. 100·00

Add 50 of the alcohol to the drug, pack in a percolator, and allow to macerate for twelve hours; then percolate until 335 of liquid has been collected, reserving the first 85 of percolate. Concentrate the subsequent percolate to a soft extract, dissolve this in the reserved portion, and add sufficient of the alcohol to make up the required volume.

Liquid extract of jaborandi may be prescribed in the form of mixture for its diaphoretic properties, but its action is not constant, as the amount of pilocarpine it contains varies. It is also used in lotions (1 part in 16) for promoting the growth of the hair.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—Fluidextractum Pilocarpi, U.S.P., is prepared by exhausting jaborandi leaves, in No. 40 powder, with 49 per cent. alcohol, and contains 0·4 per cent. w/v of the alkaloids from jaborandi leaves.

**EXTRACTUM JALAPÆ.****EXTRACT OF JALAP.**

Jalap, in coarse powder ... .. 100·00

Alcohol ... .. 500·00

Distilled Water ... .. 1000·00

Macerate the drug in the alcohol for seven days, press, filter, and recover the alcohol by distillation, leaving a soft extract, then macerate the marc with the water for four hours, strain through flannel, evaporate the product to a soft extract, mix this with the alcoholic extract, and evaporate the mixture to a firm extract at a temperature not exceeding 60°.

Extract of jalap is prescribed in pill form for its hydragogue cathartic action. The spirit-soluble portion of the extract contains the active glucoside. The gummy and sugary matters of the watery extract subdivide the resin and make it more soluble. A little soap may be added to assist the action of the extract.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

**EXTRACTUM KAVÆ LIQUIDUM.****LIQUID EXTRACT OF KAVA.**

Kava Rhizome, in No. 20 powder ... .. 100·00

Alcohol (45 per cent.), a sufficient quantity.

Alcohol, sufficient to produce ... .. 100·00

Macerate the drug with 200 of alcohol for forty-eight hours, then transfer to a percolator, and allow percolation to proceed, reserving the first 75 of the percolate, and subsequently exhausting the drug by percolation with alcohol (45 per cent.). Recover most of the alcohol from the second percolate by distillation, evaporate the



residue at a temperature below  $80^{\circ}$  to a soft extract, dissolve this in the reserved percolate, and add sufficient alcohol (90 per cent.) to make up the required volume.

Liquid extract of kava is official in the Australasian Colonies.

*Dose*.—2 to 4 mls (30 to 60 minims).

NOTES.—Extractum Kavæ may be obtained of pilular consistence by recovering the alcohol from the percolate by distillation, and evaporating if necessary. This solid extract of kava has been used as a hypnotic and local anæsthetic. *Dose*, 6 to 30 centigrams (1 to 5 grains).

## EXTRACTUM KOLÆ LIQUIDUM.

### LIQUID EXTRACT OF KOLA.

Kola Seeds, in No. 40 powder ... .. 100·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Moisten the drug with the alcohol, pack in a percolator, and exhaust by percolation with the alcohol. Reserve the first 85 of percolate; concentrate the subsequent percolate to a soft extract; dissolve this in the reserved portion, and add sufficient menstruum to make up the required volume.

This preparation is given as a "tonic" and stimulant, sometimes mixed with liquid extract of coca.

*Dose*.—6 to 12 decimils (10 to 20 minims).

## EXTRACTUM KRAMERIÆ.

### EXTRACT OF KRAMERIA.

*Synonym*.—Extract of Rhatany.

Krameria Root, in coarse powder ... .. 100·00

Distilled Water, a sufficient quantity.

Mix the drug with twice its weight of water and macerate for twenty-four hours; then pack in a percolator, exhaust by percolation with distilled water, and evaporate the percolate to dryness.

Extract of krameria is used in the preparation of lozenges and pastilles for its astringent properties, cocaine or menthol being sometimes added. Suppositories of extract of rhatany may contain 3 to 5 decigrams (5 to 8 grains) in each. For internal administration, liquid preparations such as the tincture of krameria are preferred. Pills of extract of krameria, which should be massed with syrup of glucose and a little powdered liquorice, tend to become insoluble.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

NOTE.—Extractum Krameriaë, U.S.P., is prepared in a similar way, but the percolate is heated to boiling-point and strained, before being evaporated to dryness.

## EXTRACTUM KRAMERIÆ LIQUIDUM.

### LIQUID EXTRACT OF KRAMERIA.

*Synonym*.—Liquid Extract of Rhatany.

Krameria Root, in No. 30 powder ... .. 100·00

Glycerin ... .. 10·00

Alcohol (45 per cent.) sufficient to produce ... 100·00

Mix the glycerin with 90 of the alcohol, percolate the drug with the mixture, and continue the percolation with more alcohol until exhausted. Reserve the first 80 of percolate; concentrate the subsequent percolate to a soft extract, dissolve this in the reserved portion, and add sufficient of the alcohol to make up the required volume.

This extract is a powerful astringent, and is added to tooth-washes and gargles or used as a lotion to the gums (1 part to 25 or 30).

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**NOTES.**—Liquid extract of krameria is liable to gelatinise on keeping, unless prepared by a process similar to that recommended in the case of Tinctura Kino. Fluidextractum Krameriae, U.S.P., is prepared by exhausting krameria, in No. 40 powder, with 49 per cent. alcohol.

## EXTRACTUM LACTUCÆ.

### EXTRACT OF LETTUCE.

Lettuce, fresh ... .. 100·00

Press out the juice from the fresh herb, heat it to 54°, and strain through calico to remove the chlorophyll. Heat the strained liquor to 93°, remove the coagulated albumen by filtration, evaporate the filtrate to a thin syrup by the heat of a water-bath, add the previously separated chlorophyll after passing it through a hair sieve, stir, and evaporate to a soft extract at a temperature not exceeding 60°.

It is prescribed in pill form for its mild hypnotic properties. It is sometimes used with calomel, instead of extract of henbane. Extract of lettuce is an ingredient of soothing lozenges and pastilles for use in coughs.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

## EXTRACTUM LUPULI.

### EXTRACT OF HOPS.

Hops ... ..	100·00
Alcohol ... ..	200·00
Distilled Water ... ..	1000·00

Macerate the hops with the alcohol for seven days; then press, filter, and distil off the alcohol, leaving a soft extract. Boil the marc with the water for one hour; then press, strain, and evaporate on a water-bath until a soft extract is obtained. Finally, mix the two extracts, and evaporate at a temperature not exceeding 60°, until a mass of pilular consistence is obtained.

Extract of hops is used in pills as a tonic and bitter, in a similar manner to extract of gentian.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

**NOTE.**—Fluidextractum Lupulini, U.S.P., is prepared by exhausting lupulin with 95 per cent. alcohol. The average dose of this liquid extract of lupulin is 5 decimils (8 minims).

**EXTRACTUM MAIDIS LIQUIDUM.**

LIQUID EXTRACT OF MAIZE STIGMAS.

*Synonyms.*—Liquid Extract of Zea; Liquid Extract of Corn Silk.

Maize Stigmas, in No. 40 powder ... 100·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Moisten the drug with the alcohol, pack in a percolator, cover the mass with more alcohol, and allow to macerate for twenty-four hours; then exhaust by percolation with the alcohol. Reserve the first 90 of percolate, concentrate the subsequent percolate to a soft extract, dissolve this in the reserved portion and add sufficient of the alcohol to make up the required volume.

This extract is given with a large volume of demulcent solution in urinary and renal catarrhs. A syrup (*Syrupus Maidis*) may be prepared by mixing the liquid extract with nine times its volume of syrup.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**EXTRACTUM MALTI.**

EXTRACT OF MALT.

*Synonym.*—Malt Extract.

Extract of malt may be prepared by macerating coarsely powdered malt with an equal weight of water for six hours; then adding four times the original quantity of water, heated to about 30°, digesting for an hour at a temperature not exceeding 55°, straining with strong expression, and evaporating the strained liquid rapidly, by means of a water-bath or vacuum apparatus, at a temperature not exceeding 55°, until the resulting extract is of the consistence of thick honey.

It occurs as a brown-yellow or light amber-coloured, thick, viscid liquid, having a faint pleasant characteristic odour, a sweet mucilaginous taste, and a distinct acid reaction. Soluble in all proportions of water, the solution being precipitated by strong alcohol. Its diastasic activity is destroyed at temperatures above 65°. Specific gravity about 1·375.

Malt extract consists chiefly of maltose (50 per cent. or more) and dextrin, with some dextrose, and should also contain a fair proportion of diastase. The diastasic value is usually stated in terms based upon the proportion of starch it is capable of converting into sugar, or the time required to convert a fixed proportion; this is found by adding a known weight to a thin starch mucilage kept at a given temperature, and determining the time required for the total disappearance of the starch, a portion of the reaction mixture being removed from time to time and tested with iodine. Some observers record the time at which the digestion mixture ceases to give a blue colouration with iodine, while others prefer to record the point at which a red colouration is no longer produced with iodine, indicating that the intermediate product of digestion, dextrin, has also been converted into sugar. The determination of the actual quantity of sugar produced has also been used as a measure of diastasic action.



This method is carried out as follows:—Mix as much starch as corresponds to 1 gramme of the anhydrous substance with a few mils of cold distilled water in a mortar, add the mixture to 65 mils of boiling water, and rinse the mortar with sufficient water to make the mucilage measure 80 mils; boil the mucilage for about a minute to ensure complete gelatinisation, cool to 46°, and add 2 decigrams of the extract of malt under examination, dissolved in sufficient distilled water to produce 20 mils of solution. Maintain the temperature of the mixture at 40° for half an hour, then boil to stop the diastasic action, cool, add sufficient distilled water to make the liquid measure 100 mils, and ascertain how much of the solution is required to reduce all the copper in 10 mils of Fehling's solution, previously diluted with 40 mils of water and boiled in a porcelain beaker. From the maltose thus found deduct that introduced with the extract of malt (determined by titrating 10 mils of Fehling's solution with a solution containing 1 gramme of the extract in 100 mils), and express the diastasic power by the weight of starch converted by 100 parts of the extract. The calculations may be combined by the use of the following formula, where  $n$  is the number of mils used in the diastase titration,  $m$  is the number of mils of 1 per cent. w/v solution of extract of malt used in the maltose titration, and 1.184 is the factor

$\frac{100}{84.4}$  for calculating maltose into starch:—

$$\left. \begin{array}{l} \text{Weight of anhydrous starch} \\ \text{completely converted} \end{array} \right\} \dots = 1.184 \left( \frac{8.05}{n} - \frac{1.61}{m} \right)$$

Results are influenced not only by the time and concentration of the reacting substances, but the various kinds of starch give different results, potato starch and arrowroot being among the most easily digested. Another factor often overlooked is the varying quantity of water in air-dry starch.

The medicinal value of malt extract depends upon the proportion of total solid nutritive carbohydrates it contains, and upon its diastasic action, the latter enabling it to convert the starchy constituents of food into soluble carbohydrates, chiefly maltose. The extract is given to children and adults for its nutritive properties. Children take the thick extract readily from a spoon, or it may be dissolved in a little warm milk. Many of the extracts on the market contain no diastase, the ferment having been destroyed during evaporation. Extract of malt is used as a vehicle for the administration of cod-liver oil (see *Extractum Malti cum Oleo Morrhuae*), and the liquid extract is given with hæmoglobin, extract of cascara, and various salts, but it should be noted that extract of malt is inferior to syrup as a "cover" for bitter substances, and that satisfactory results cannot be obtained by mixing it with ferrous phosphate preparations or acids. Extract of malt becomes acid on keeping, and does not then mix so readily with the cod-liver oil.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

*NOTE.*—Extract of malt should be kept in well-closed vessels, in a cool place.

**EXTRACTUM MALTI CUM FERRO.**

EXTRACT OF MALT WITH IRON.

*Synonym.*—Malt and Iron.

Iron and Ammonium Citrate ... ..	0·85
Distilled Water ... ..	1·00
Liquid Extract of Malt, a sufficient quantity to produce ... ..	100·00

Dissolve the iron and ammonium citrate in the water, and add the liquid extract of malt.

This preparation should be made freshly, as required.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

**EXTRACTUM MALTI CUM FORMATIBUS.**

EXTRACT OF MALT WITH FORMATES.

*Synonym.*—Malt and Formates.

Potassium Formate ... ..	0·50
Sodium Formate ... ..	0·50
Distilled Water ... ..	5·00
Liquid Extract of Malt, sufficient to produce ... ..	100·00

Dissolve the formates in the distilled water, and add the liquid extract of malt.

This preparation should be made freshly, as required.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

**EXTRACTUM MALTI CUM GLYCEROPHOSPHATIBUS.**

EXTRACT OF MALT WITH GLYCEROPHOSPHATES.

*Synonym.*—Malt and Glycerophosphates.

Potassium Glycerophosphate ... ..	1·00
Sodium Glycerophosphate ... ..	1·00
Distilled Water, a sufficient quantity.	
Liquid Extract of Malt, a sufficient quantity to produce ... ..	100·00

Dissolve the glycerophosphates in sufficient distilled water to produce a syrupy liquid, and add the liquid extract of malt.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

**EXTRACTUM MALTI CUM HÆMOGLOBINO.**

EXTRACT OF MALT WITH HÆMOGLOBIN.

*Synonym.*—Malt and Hæmoglobin.

Hæmoglobin ... ..	12·50
Liquid Extract of Malt, a sufficient quantity to produce ... ..	100·00

Triturate the hæmoglobin with a small quantity of the liquid

extract till quite smooth, then mix with sufficient of the liquid extract to produce 100, and strain if necessary.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

### EXTRACTUM MALTI CUM HYPOPHOSPHITIBUS.

EXTRACT OF MALT WITH HYPOPHOSPHITES.

*Synonym.*—Malt and Hypophosphites.

Calcium Hypophosphite	...	...	...	0·50
Sodium Hypophosphite	...	...	...	0·50
Distilled Water	...	...	...	5·00
Liquid Extract of Malt, a sufficient quantity to produce	...	...	...	100·00

Dissolve the calcium hypophosphite in 4 of the distilled water, and the sodium hypophosphite in the remainder of the water; then mix the two solutions with the liquid extract of malt.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

### EXTRACTUM MALTI CUM HYPOPHOSPHITIBUS ET OLEO MORRHUÆ.

EXTRACT OF MALT WITH HYPOPHOSPHITES AND COD-LIVER OIL.

*Synonym.*—Malt and Hypophosphites with Cod-liver Oil.

Calcium Hypophosphite	...	...	...	0·50
Sodium Hypophosphite	...	...	...	0·50
Distilled Water	...	...	...	5·00
Cod-liver Oil	...	...	...	15·00
Extract of Malt, a sufficient quantity to produce, by volume	...	...	...	100·00

Dissolve the calcium hypophosphite in 4 of the distilled water, and the sodium hypophosphite in the remainder of the water; then mix the two solutions with about 75, by volume, of the extract of malt, stir in the cod-liver oil until thoroughly incorporated, and add sufficient of the extract of malt to produce the required volume.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

### EXTRACTUM MALTI CUM OLEO MORRHUÆ.

EXTRACT OF MALT WITH COD-LIVER OIL.

*Synonym.*—Malt and Cod-liver Oil.

Extract of Malt, by volume	...	...	...	85·00
Cod-liver Oil	...	...	...	15·00

Add the oil gradually to the extract of malt, and mix thoroughly by stirring after each addition.

Extract of malt with cod-liver oil mixes readily with milk, and is best administered in this combination.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).



**EXTRACTUM MALTI CUM PANCREATINO.**

EXTRACT OF MALT WITH PANCREATIN.

*Synonym.*—Malt and Pancreatin.

Pancreatin	...	...	...	...	...	2'00
Distilled Water, a sufficient quantity.						
Liquid Extract of Malt, a sufficient quantity to produce	...	...	...	...	...	100'00

Triturate the pancreatin with sufficient water to form a syrupy liquid, and add the liquid extract of malt.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

**EXTRACTUM MALTI CUM PEPSINO.**

EXTRACT OF MALT WITH PEPSIN.

*Synonym.*—Malt and Pepsin.

Pepsin	...	...	...	...	...	5'00
Distilled Water, a sufficient quantity.						
Liquid Extract of Malt, a sufficient quantity to produce	...	...	...	...	...	100'00

Triturate the pepsin with sufficient water to form a syrupy liquid, and mix with sufficient of the liquid extract to produce 100.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

**EXTRACTUM MALTI CUM QUININA ET STRYCHNINA.**

EXTRACT OF MALT WITH QUININE AND STRYCHNINE.

*Synonym.*—Malt and Quinine with Strychnine.

Quinine Hydrochloride	...	...	...	...	0'20
Solution of Strychnine Hydrochloride...					1'00
Distilled Water	...	...	...	...	5'00
Liquid Extract of Malt, sufficient to produce	...	...	...	...	100'00

Mix the solution of strychnine hydrochloride with the distilled water, and dissolve the quinine hydrochloride in the mixture; then make up to the required volume with liquid extract of malt.

*Dose.*—8 to 15 mls (2 to 4 fluid drachms).

NOTE.— This preparation contains about  $\frac{1}{8}$  grain of quinine hydrochloride, and  $\frac{1}{180}$  grain of strychnine hydrochloride in 1 fluid drachm.

**EXTRACTUM MALTI ET CASCARÆ.**

EXTRACT OF MALT AND CASCARA.

*Synonym.*—Malt and Cascara

Liquid Extract of Cascara	...	...	...	...	12'50
Spirituous Extract of Liquorice	...	...	...	...	12'50
Liquid Extract of Malt, a sufficient quantity to produce	...	...	...	...	100'00

Mix the extract of malt with the extract of liquorice, and add the liquid extract of cascara.

This preparation should be made freshly, as required.

*Dose*.—4 to 15 mils (1 to 4 fluid drachms).

## EXTRACTUM MALTI LIQUIDUM.

### LIQUID EXTRACT OF MALT.

Extract of Malt, by volume	...	...	...	68.00
Alcohol	...	...	...	7.50
Distilled Water, sufficient to produce	...	...	...	100.00

Mix the alcohol with 25 of the water, dilute the extract of malt with the mixture, and add sufficient distilled water to produce 100. Allow the liquid extract to stand till clear, then decant or syphon off the clear liquid. Specific gravity about 1.2.

Liquid extract of malt is more convenient in use than the thick viscid extract, but its nutritive properties are not so great. It may be added to emulsions of cod-liver oil, and is a suitable vehicle for the administration of the formates, hypophosphites, glycerophosphates, and phosphates, but does not mix well with ferrous phosphate or acids.

*Dose*.—4 to 15 mils (1 to 4 fluid drachms).

*NOTES*.—This preparation may also be made by concentrating an aqueous infusion of malt by evaporation *in vacuo*, and adding the alcohol when the specific gravity of the liquid is about 1.275. Another method is to extract malt in coarse powder by percolation with alcohol diluted with three times its volume of water, allowing the percolation to proceed until the weight of the product is equivalent to three-fourths the weight of the malt originally taken.

## EXTRACTUM MALTI SICCCUM.

### DRIED EXTRACT OF MALT.

Dried extract of malt is prepared by carefully desiccating ordinary extract of malt in a vacuum.

It occurs as a coarse, yellowish, somewhat hygroscopic powder. Readily soluble in water.

Dried extract of malt contains about 75 per cent. of maltose, 1½ per cent. of phosphates, and 5 per cent. of albuminoids. It is given with milk or wine, and may conveniently be given to children by spreading it between slices of buttered bread.

*Dose*.—4 to 8 grammes (1 to 2 drachms).

## EXTRACTUM MATICÆ LIQUIDUM.

### LIQUID EXTRACT OF MATICO.

Matico, in No. 40 powder	...	...	...	100.00
Alcohol (70 per cent.), sufficient to produce	...	...	...	100.00

Moisten the drug with the alcohol, pack in a percolator, and exhaust by percolation with the alcohol. Reserve the first 80 of

percolate, recover most of the alcohol by distillation from the subsequent percolate, evaporate the residue to a soft extract, dissolve this in the reserved portion, and add sufficient menstruum to make up the required volume.

Liquid extract of matico is used as an aromatic astringent in mixture form.

*Dose*.—4 mils (1 fluid drachm).

## EXTRACTUM MEDULLÆ RUBRÆ.

### EXTRACT OF RED BONE MARROW.

*Synonym*.—Medullary Glyceride; Glycerin Extract of Red Bone Marrow.

Red Bone Marrow	...	...	...	...	25.00
Chloroform Water	...	...	...	...	50.00
Glycerin	...	...	...	...	50.00

Mix the marrow with the glycerin by vigorous trituration, add the chloroform water, and beat the whole together frequently during one hour; then strain, press, and make up to 100 with equal parts of chloroform water and glycerin.

Extract of red bone marrow is given in the anæmias, and especially in pernicious anæmia, with a view to increasing the number of the red blood corpuscles by stimulating the red bone marrow.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

## EXTRACTUM MEZEREI.

### EXTRACT OF MEZEREON.

*Synonym*.—Extractum Mezerei Æthereum; Ethereal Extract of Mezereon.

Mezereon Bark, cut small	...	...	...	100.00
Alcohol	...	...	...	1000.00
Methylated Ether (specific gravity, 0.720)	...	...	...	125.00

Add 750 of alcohol to the drug and macerate for three days, with frequent agitation; then strain, press, and repeat the operation with the remainder of the alcohol. Mix the strained liquids, filter, remove the greater part of the alcohol by distillation, and evaporate the residue to a soft extract. Next macerate the extract with the ether for twenty-four hours, shaking frequently; then decant the ethereal solution, recover part of the ether by distillation, and evaporate the residue to the consistence of a soft extract.

Ethereal extract of mezereon is rubefacient and vesicant, and was formerly a constituent of the official mustard liniment.

*Notes*.—Extractum Mezerei Æthereum was official in the British Pharmacopœia, 1885. Fluidextractum Mezerei, U.S.P., is prepared by exhausting mezereon, in No. 30 powder, with 76 per cent. alcohol,



**EXTRACTUM NUCIS VOMICÆ.****EXTRACT OF NUX VOMICA.**

Liquid Extract of Nux Vomica, by volume... 350·00

Milk Sugar, sufficient to produce ... 105·00

Remove the alcohol from the liquid extract by distillation, add the milk sugar, mix, and evaporate to a firm extract, which should weigh 105, and contain 5 per cent. of strychnine. The proportion of milk sugar required is determined by evaporating 35 mls of liquid extract of nux vomica to a moderately firm extract, weighing the residue, and multiplying the difference between the weight of the residue and 10·5 grammes by 10. On account of the presence of fat extracted from the nux vomica seeds by the alcohol used in making liquid extract of nux vomica, the solid extract cannot readily be powdered. If the fat be removed, the extract is readily reduced to powder, and may be adjusted to the standard strength by the addition of milk sugar.

Extract of nux vomica is very largely prescribed in pill form, frequently with aperients. It is combined with aloes and belladonna (see *Pilula Aloes et Nucis Vomicae*), or cascara and belladonna (see *Pilula Cascarae et Belladonnæ et Nucis Vomicae*), for its action in promoting peristalsis; it is also given with reduced iron, arsenic, or phosphorus, for its tonic action in anæmias.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

**NOTES.**—*Extractum Nucis Vomicae*, B.P. 1885, was prepared by exhausting 100 of nux vomica, in fine powder, with 400 of rectified spirit and 100 of water; the spirit was then recovered by distillation, and the strength of the residual extract adjusted so that it was equal to 15 per cent. of total alkaloid. *Extractum Nucis Vomicae*, U.S.P., contains 5 per cent. of strychnine; it is prepared by exhausting nux vomica, in No. 20 powder, with acetic acid and water, and adding alcohol to the percolate, which is then allowed to settle, filtered, and evaporated to dryness, after which well-dried milk sugar is added.

**EXTRACTUM NUCIS VOMICÆ LIQUIDUM.****LIQUID EXTRACT OF NUX VOMICA.**

Nux Vomica, in No. 20 powder ... 100·00

Alcohol (70 per cent.), a sufficient quantity.

Alcohol, a sufficient quantity.

Add 50 of 70 per cent. alcohol to the powdered drug, set aside for six hours, then pack firmly in a percolator, saturate and cover the mass with 70 per cent. alcohol, and again set aside for twenty-four hours. Allow percolation to proceed slowly, adding more 70 per cent. alcohol as required, and reserve the first 75 of percolate. Proceed with the percolation until the drug is exhausted, press the marc, add the expressed liquid to the weak percolate, recover the alcohol by distillation, and evaporate the residue to 6·2. Mix this residue with three times its volume of alcohol (90 per cent.), add the mixture to the reserved percolate, set aside for twenty-four hours, pour off the clear liquid, filter the remainder, then standardise and adjust by the addition of 70 per cent. alcohol, so that the finished product shall contain 1·5 per cent. of strychnine.

Liquid extract of *nux vomica* is used chiefly for the preparation of tincture and extract of *nux vomica*. On account of its high concentration, the liquid extract is not much prescribed for internal use, the tincture being preferred.

*Dose*.— $\frac{1}{4}$  to 2 decimils (1 to 3 minims).

NOTES.—Prepared by the process described, liquid extract of *nux vomica* contains an inconvenient proportion of fat, so that the tincture prepared therefrom frequently deposits fatty matters in cold weather, and forms a cloudy mixture with water, fat globules separating. The presence of fat in the liquid extract may be partly avoided by evaporating the weak percolate to one-third of its bulk, cooling, and filtering through paper before continuing the evaporation. Fluidextractum Nucis Vomicae, U.S.P., is prepared by exhausting *nux vomica*, in No. 40 powder, with a mixture of alcohol, water, and acetic acid, the product being subsequently standardised to contain 1 per cent. w/v of strychnine.

## EXTRACTUM OLEÆ FOLIORUM.

### EXTRACT OF OLIVE LEAVES.

Olive Leaves, fresh	...	...	...	...	100·00
Alcohol, a sufficient quantity.					

Exhaust the drug by percolation, recover most of the alcohol by distillation, and evaporate the residue to a soft extract.

This extract is given as a "tonic" and antiperiodic, in the form of pills, or triturated with some aromatic water to form a mixture.

*Dose*.—2 to 5 decigrams (3 to 8 grains).

## EXTRACTUM OPII.

### EXTRACT OF OPIUM.

Opium, in slices	...	...	...	...	200·00
Distilled Water	...	...	...	...	1500·00

Exhaust the opium by repeated maceration with the distilled water, using one-third of the water on each occasion, macerating for twenty-four hours, and expressing the liquid. Mix the three liquids, strain through flannel, and evaporate to about 100. The product should contain 20 per cent. of morphine. If stronger, it should be diluted with water or milk sugar; if weaker, it may be mixed with a stronger extract so as to produce a preparation of proper strength and consistence.

Extract of opium is used principally in pill form for its sedative and anodyne properties. It is often combined with mercurials when these are to be taken for long periods, to diminish their action on the bowels. It is used in pessaries containing 12 centigrams (2 grains) each, and in suppositories containing 6 centigrams (1 grain) each. The pessaries may be prepared with the gelato-glycerin basis, suppositories with oil of theobroma, the extract being rubbed into a thin paste with water before mixing with the basis.

*Dose*.—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

NOTE.—Extractum Opii, U.S.P., is a powder, standardised by the addition of milk sugar to contain 20 per cent. of morphine.

**EXTRACTUM OPII LIQUIDUM.**

## LIQUID EXTRACT OF OPIUM.

Extract of Opium	...	...	...	...	3.75
Alcohol	...	...	...	...	20.00
Distilled Water	...	...	...	...	80.00

Add the water to the extract, mix, and set aside for an hour, stirring at frequent intervals; then add the alcohol, and filter after standing for twenty-four hours in a cool place. The product should measure 100, and contain the equivalent of 0.7 to 0.8 per cent. of anhydrous morphine. Specific gravity, 0.985 to 0.995.

Liquid extract of opium is used in mixtures for its sedative properties, being preferred to the tincture by many practitioners. Soothing lotions and injections may contain 12 to 18 decimils (20 to 30 minims) to 30 mils (1 fluid ounce), with boric acid, lead subacetate, zinc sulphate, or other astringents.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

*NOTE.*—Liquid extract of opium contains the same proportion of morphine as tincture of opium, but is much weaker in alcohol; to the latter difference is due its advantage over the tincture for many purposes.

**EXTRACTUM PAPAVERIS.**

## EXTRACT OF POPPY.

Poppy Capsules, freed from seeds and in					
No. 20 powder...	...	...	...	...	100.00
Alcohol	...	...	...	...	12.50
Distilled Water, boiling, a sufficient quantity.					

Digest the poppy capsules in 250 of the boiling water for twenty-four hours, stirring frequently; then transfer to a percolator, and exhaust by percolation with more boiling distilled water. Evaporate the liquid on a water-bath to 125, when cold add the alcohol, allow to stand for twenty-four hours, filter, and evaporate on a water-bath until a mass of pilular consistence is obtained.

Extract of poppy has about one-sixth the morphine strength of extract of opium. It is used internally in pill form as a mild sedative, and dissolved in hot water as a fomentation.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

*NOTE.*—Extractum Papaveris was official in the British Pharmacopœia, 1885

**EXTRACTUM PAPAVERIS LIQUIDUM.**

## LIQUID EXTRACT OF POPPY.

Poppy Capsules, freed from seeds and in					
No. 20 powder	...	...	...	...	45.00
Alcohol	...	...	...	...	25.00
Distilled Water, boiling, a sufficient quantity.					

Digest the poppy capsules in 100 of the boiling water for twenty-four hours, stirring frequently; then transfer to a percolator, and



exhaust by percolation with more boiling distilled water. Evaporate the liquid on a water-bath to 75; when cold add the alcohol, allow to stand for twenty-four hours, filter, and make up to 100 with distilled water.

Liquid extract of poppy is an ingredient of cough mixtures and syrups, being employed for its mildly soothing properties. It is sometimes added to astringent lotions and injections, 2 mls (30 minims) to 30 mls (1 fluid-ounce).

*Dose.*—2 to 4 mls (30 to 60 minims).

## EXTRACTUM PAREIRÆ LIQUIDUM.

LIQUID EXTRACT OF PAREIRA.

Pareira Root, in No. 40 powder     ...     ...     100·00  
Alcohol, a sufficient quantity.

Distilled Water, boiling, a sufficient quantity.

Mix the drug with about 120 of the boiling water, allow to macerate for twenty-four hours, then pack in a percolator and percolate with boiling water till exhausted. Determine the proportion of extractive matter in the percolate, evaporate the latter until it contains one-third its weight of extractive, and add sufficient alcohol to increase the volume of product by one-third, afterwards filtering if necessary.

Liquid extract of pareira usually throws down a heavy deposit, and is difficult to filter. It is used in catarrhal affections of the genito-urinary system, but its value is very doubtful. The extract is best prescribed in mixture form, with infusion of buchu or bearberry.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

NOTES.—The following modified process has been suggested as yielding a superior preparation to the official liquid extract of pareira:—Mix together 20 of alcohol, 120 of glycerin, and 60 of distilled water; moisten 100 of pareira root, in No. 10 powder, with 40 of the mixture; then pack in a percolator, and percolate with the remainder of the mixture, continuing the percolation with 20 per cent. alcohol until exhaustion is complete. Reserve the first 75 of percolate, concentrate the percolate to a soft extract, dissolve this in the reserved portion, and add sufficient 20 per cent. alcohol to make up the required volume. Fluidextractum Pareiræ, U.S.P., is prepared by exhausting the drug with a mixture of glycerin, alcohol, and water.

## EXTRACTUM PHYSOSTIGMATIS.

EXTRACT OF CALABAR BEAN.

*Synonym.*—Extract of Physostigma.

Calabar Bean, in No. 40 powder     ...     ...     100·00  
Milk Sugar, in fine powder, a sufficient quantity.  
Alcohol ...     ...     ...     ...     ...     500·00

Add 125 of the alcohol to the powdered drug, and allow to macerate for forty-eight hours with occasional agitation; then transfer to a percolator, percolate slowly with the remainder of the

alcohol, press the marc, and add the expressed liquid to the percolate. Concentrate the percolate by distillation and subsequent evaporation, weigh the resulting soft extract, add three times its weight of milk sugar, and mix thoroughly so as to produce an extract of firm consistence.

Extract of Calabar bean is given internally in pill form. The extract is best stiffened with a little powdered liquorice. In acute tetanus hourly doses of the extract are sometimes prescribed. If in pills these must be soft to dissolve readily; but in such cases the extract is best rubbed with sufficient liquorice to reduce it to a granular state, and the dose enclosed in a cachet.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTE.*—Extractum Physostigmatis, U.S.P., is prepared by exhausting the drug, in No. 80 powder, with alcohol, the product being a powder, standardised by the addition of powdered liquorice to contain 2 per cent. of ether-soluble alkaloids.

## EXTRACTUM PICRORHIZÆ LIQUIDUM.

### LIQUID EXTRACT OF PICRORHIZA.

Picrorhiza, in No. 60 powder ...	...	...	100·00
Alcohol (60 per cent.), sufficient to produce ...			100·00

Mix the drug with about 40 of the alcohol, pack in a percolator, saturate the mass with alcohol, set aside for forty-eight hours, then exhaust by percolation with the alcohol. Reserve the first 85 of percolate, distil off most of the alcohol from the subsequent percolate, evaporate the residue to a soft extract, dissolve this in the reserved percolate, and add sufficient of the alcohol to make up the required volume.

Liquid extract of picrorhiza is official in India and the Eastern Colonies, where it is used as a bitter and antiperiodic.

*Dose.*— $1\frac{1}{2}$  to 4 mils (20 to 60 minims).

## EXTRACTUM PINI CANADENSIS LIQUIDUM.

### LIQUID EXTRACT OF PINUS CANADENSIS.

Pinus Canadensis Bark, in No. 40 powder ...	...	100·00
Alcohol (45 per cent.), sufficient to produce ...		100·00

Moisten the drug with the alcohol, pack in a percolator, and exhaust by percolation with the alcohol. Reserve the first 85 of percolate, concentrate, distil off most of the alcohol from the subsequent percolate, evaporate the residue to a soft extract, dissolve this in the reserved portion, and add sufficient of the alcohol to make up the required volume.

This extract is used as an astringent injection in leucorrhœa and gonorrhœa, diluted with 10 parts of water. Zinc sulphate may be added to increase the astringency.

*Dose.*—1 to 4 mils (15 to 60 minims).

**EXTRACTUM PISCIDIÆ LIQUIDUM.**

## LIQUID EXTRACT OF PISCIDIA.

Piscidia ... .. 100·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Moisten the drug with 40 of the alcohol, pack in a percolator, add sufficient alcohol to saturate, set aside for forty-eight hours, then exhaust by percolation with the alcohol. Reserve the first 85 of percolate, concentrate the subsequent percolate to a soft extract, dissolve this in the reserved portion, and add sufficient alcohol to produce 100.

This extract has a sedative action, and has been recommended as a narcotic, being said to cause neither headache nor constipation.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTE.*—Extractum Piscidiæ may be obtained as a solid by evaporating the liquid extract to dryness; dose, 6 to 30 centigrams (1 to 5 grains).

**EXTRACTUM PRUNI VIRGINIANÆ LIQUIDUM.**

## LIQUID EXTRACT OF WILD CHERRY.

*Synonym.*—Liquid Extract of Virginian Prune.

Wild Cherry Bark, in No. 30 powder ... 100·00

Glycerin ... .. 20·00

Alcohol (20 per cent.), sufficient to produce ... 100·00

Mix the glycerin with 30 of the alcohol, moisten the bark with the mixture, pack in a percolator, allow to macerate for forty-eight hours with the remaining menstruum, and exhaust by percolation with the alcohol. Reserve the first 90 of percolate, concentrate the subsequent percolate to a soft extract, dissolve this in the reserved portion, and add sufficient alcohol to produce 100.

Liquid extract of wild cherry is added to cough syrups and mixtures for its mildly sedative properties.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

*NOTE.*—This extract corresponds to Fluidextractum Pruni Virginianæ, U.S.P.

**EXTRACTUM QUASSIÆ.**

## EXTRACT OF QUASSIA.

Quassia Wood, rasped... .. 100·00

Distilled Water, a sufficient quantity.

Macerate the quassia with 50 of the water for twelve hours, then percolate till exhausted, filter the liquid, and evaporate on a water-bath to a pilular consistence.

Extract of quassia is prescribed in pills as a bitter, with reduced iron, or sulphate of iron, and generally in place of extract of gentian.

*Dose.*—2 to 3 decigrams (3 to 5 grains).

*NOTES.*—Extractum Quassiæ was official in the British Pharmacopœia, 1885. Extractum Quassiæ, U.S.P., is prepared by extracting the drug with water, evaporating the extract to dryness, and adding sufficient milk sugar to make the weight of product equal one-tenth that of the original drug. Average dose, 65 milligrams (1 grain). Fluidextractum Quassiæ, U.S.P., is prepared by exhausting the drug with 32 per cent. alcohol. Average dose, 5 decimils (8 minims).



**EXTRACTUM RHAMNI FRANGULÆ.**

EXTRACT OF RHAMNUS FRANGULA.

*Synonym.*—Extractum Frangulæ.

Rhamnus Frangula Bark, in No. 20 powder... 100·00

Distilled Water, a sufficient quantity.

Moisten the drug with the water, set aside for several hours, then exhaust by percolation with the water, and evaporate to dryness.

This extract was formerly official, and is used like extract of cascara.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

**EXTRACTUM RHAMNI FRANGULÆ LIQUIDUM.**

LIQUID EXTRACT OF RHAMNUS FRANGULA.

*Synonym.*—Extractum Frangulæ Liquidum.

Rhamnus Frangula Bark, in No. 40 powder . 100·00

Alcohol, a sufficient quantity.

Distilled Water, a quantity.

Mix 40 of alcohol with 60 of distilled water, moisten the powder with the mixture, pack in a percolator, cover the powder with the diluted alcohol, allow to macerate for forty-eight hours, and exhaust by percolation with the same liquid. Reserve the first 80 of percolate, concentrate the remainder to a soft extract, dissolve this in the reserved portion, and add sufficient of the diluted alcohol to produce 100.

This extract is used for similar purposes to the liquid extract.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

NOTES.—Extractum Rhamni Frangulæ Liquidum was official in the British Pharmacopœia, 1885, and corresponds to Fluidextractum Frangulæ, U.S.P.

**EXTRACTUM RHEI.**

EXTRACT OF RHUBARB.

Rhubarb Root, in No. 20 powder ... 100·00

Alcohol (60 per cent.), a sufficient quantity.

Moisten the drug with the alcohol, set aside for forty-eight hours, then exhaust by slow percolation, recover most of the alcohol by distillation, and evaporate the residue to a dry extract.

Extract of rhubarb is prescribed in pills, generally in combination with carminatives such as gingerine or powdered ginger, or with aloin, podophyllin, or extract of nux vomica.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

NOTE.—Extractum Rhei, U.S.P., is prepared by evaporating to a pilular consistence Fluidextractum Rhei, made by exhausting rhubarb with 76 per cent. alcohol;

**EXTRACTUM RHEI COMPOSITUM.**

COMPOUND EXTRACT OF RHUBARB.

Extract of Rhubarb ... 60·00

Extract of Barbados Aloes ... 20·00

Jalap Resin, in powder ... 10·00

Hard Soap, in powder ... 10·00

Mix the extracts with the jalap resin, and add the powdered soap.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

NOTE.—This preparation is official in the Austrian Pharmacopœia.

**EXTRACTUM RHEI LIQUIDUM.**

## LIQUID EXTRACT OF RHUBARB.

Rhubarb, in No. 30 powder ... .. 100·00

Alcohol, a sufficient quantity.

Distilled Water, a sufficient quantity.

Mix 85 of alcohol with 15 of distilled water, moisten the powder with 40 of the mixture, pack in a percolator, cover the powder with the diluted alcohol, allow to macerate for forty-eight hours, and exhaust by percolation with the same liquid. Reserve the first 75 of percolate, evaporate the remainder at a temperature not exceeding 70° to a soft extract, dissolve this in the reserved portion, and add sufficient diluted alcohol to produce 100.

Liquid extract of rhubarb may be used in place of compound tincture of rhubarb for addition to stomachic mixtures. On account of the tendency of simple rhubarb preparations to cause griping it should be combined with suitable carminatives (ginger, peppermint, cardamoms).

*Dose.*—6 to 18 decimils (10 to 30 minims).

NOTE.—This preparation corresponds to Fluidextractum Rhei, U.S.P.

**EXTRACTUM ROSÆ LIQUIDUM.**

## LIQUID EXTRACT OF ROSE.

Dried Red Rose Petals, in No. 20 powder ... 100·00

Glycerin ... .. 10·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Exhaust the petals by percolation with the glycerin and 90 of the alcohol, previously mixed. Reserve the first 75 of percolate, and evaporate the remainder to a soft extract at a temperature not exceeding 50°; dissolve this in the reserved portion, and add sufficient of the alcohol to make up the required volume.

Liquid extract of rose petals is a suitable colouring agent for acid mixtures, in the proportion of 1 mil (15 minims) to 30 mils (1 fluid ounce) of mixture. Alkalies change the fine red colour to a murky green.

NOTE.—This preparation corresponds to Fluidextractum Rosæ, U.S.P.

**EXTRACTUM SALICIS NIGRÆ LIQUIDUM.**

## LIQUID EXTRACT OF BLACK WILLOW.

Black Willow Bark, in No. 20 powder ... 100·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Moisten the drug with the alcohol, pack in a percolator, and exhaust by percolation with the alcohol. Reserve the first 85 of percolate, distil off most of the alcohol from the subsequent percolate, evaporate the residue to a soft extract, dissolve this in the reserved portion, and add sufficient of the alcohol to make up the required volume.

This extract is used in mixture form with other sexual sedatives and anaphrodisiacs.

*Dose.*—1 to 4 mils (15 to 60 minims).

**EXTRACTUM SANGUINARIÆ LIQUIDUM.**

LIQUID EXTRACT OF SANGUINARIA.

*Synonym.*—Liquid Extract of Blood Root.

Sanguinaria, in No. 30 powder ... .. 100·00

Acetic Acid, a sufficient quantity.

Distilled Water, a sufficient quantity.

Mix 30 of acetic acid with 70 of water, moisten the powder with 30 of the mixture, macerate for forty-eight hours, then pack in a percolator, and percolate with the mixture till exhausted. Reserve the first 85 of percolate, evaporate the remainder to a soft extract, dissolve this in the reserved portion, and add sufficient of the diluted acid to make up the required volume.

This extract is prescribed in mixture form with ipecacuanha and lobelia for its expectorant and antiasthmatic properties. It is also used sometimes with pulsatilla and viburnum in dysmenorrhœa.

*Dose.*—6 to 18 centimils (1 to 3 minims).

NOTE.—This preparation corresponds to Fluidextractum Sanguinariæ, U.S.P.

**EXTRACTUM SARSÆ LIQUIDUM.**

LIQUID EXTRACT OF SARSAPARILLA.

Sarsaparilla, in No. 40 powder ... .. 100·00

Glycerin ... .. 10·00

Alcohol (20 per cent.), sufficient to produce ... 100·00

Exhaust the drug by repercolation, first moistening one-third of the powder with 20 of the alcohol, packing in a percolator, setting aside for twenty-four hours, then percolating with more of the alcohol, and reserving the first 20 of percolate. Moisten half of the remaining powder with this reserved percolate, and percolate as before, continuing the process with the weaker percolate from the first operation, and again reserving the first 20 of percolate. Repeat the operation with the remainder of the drug, moistening it with the reserved percolate, and continuing the percolation with the weaker percolate passed through the first and second portions, until the product measures 90. Add the glycerin and sufficient of the alcohol, if necessary, to make the product measure 100.

Liquid extract of sarsaparilla is used in mixtures often with mercuric chloride and the alkali iodides, as an "alterative" in syphilis.

*Dose.*—8 to 15 mls (2 to 4 fluid drachms).

NOTE.—Fluidextractum Sarsaparillæ, U.S.P., is prepared by exhausting the drug with 32 per cent. alcohol. Average dose, 2 mls (30 minims).

**EXTRACTUM SCILLÆ LIQUIDUM.**

LIQUID EXTRACT OF SQUILL.

Squill, in No. 10 powder ... .. 100·00

Alcohol (70 per cent.), sufficient to produce ... 100·00

Moisten the drug with 20 of the alcohol, pack in a percolator, and exhaust by percolation with the same liquid. Reserve the first 70 of



percolate, distil off most of the alcohol from the subsequent percolate, evaporate the residue to a soft extract, and dissolve this in the reserved portion; then add sufficient of the alcohol to produce the required volume, and filter.

*Dose.*— $\frac{1}{2}$  to 2 decimils (to 3 minims).

*NOTES.*—This extract may be used, with advantage, to make oxymel, syrup, tincture, and vinegar of senna; the products corresponding closely to the official preparations and keeping better. Fluidextractum Scillæ, U.S.P., is prepared with acetic acid and water.

## EXTRACTUM SENEGÆ LIQUIDUM.

### LIQUID EXTRACT OF SENEGA.

Senega, in No. 40 powder	...	...	...	100·00
Solution of Potash	...	...	...	3·00
Alcohol (70 per cent.), sufficient to produce	...	...	...	100·00

Moisten the powder senega with the solution of potash and 30 of the alcohol, previously mixed, and exhaust by percolation with the alcohol. Reserve the first 85 of percolate, distil off most of the alcohol from the subsequent percolate, evaporate the residue to a soft extract, dissolve this in the reserved portion, and add sufficient of the alcohol to make up the required volume.

This extract may be used in place of tincture of senega for its expectorant properties.

*Dose.*—3 to 12 camils (5 to 20 minims).

*NOTE.*—This preparation corresponds to Fluidextractum Senegæ, U.S.P.

## EXTRACTUM SENNÆ LIQUIDUM.

### LIQUID EXTRACT OF SENNA.

*Synonyms.*—Extractum Sennæ Leguminosarum Liquidum; Liquid Extract of Senna Pods.

Senna, in No. 40 powder	...	...	...	100·00
Alcohol (70 per cent.), sufficient quantity.	...	...	...	

Distilled Water, a sufficient quantity.

Mix 37·5 of alcohol with 75 of water, and moisten the senna with the mixture. Pack tightly in a closed vessel, macerate for three days, express forcibly, and reserve the product. Add to the marc sufficient of the same menstruum to produce altogether 100 of product. Express again after twenty-four hours' maceration, and mix the product with the reserved portion. Heat in a closed vessel by means of a water-bath to 94°, and maintain at that temperature for ten minutes. When cold, add menstruum, if necessary, to make the liquid extract measure 100, and filter.

Liquid extract of senna has come into favour as the most active and certain of the senna preparations. It should be prescribed with aromatics and carminatives, in order to diminish any tendency to griping.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Fluidextractum Sennæ, U.S.P., is prepared by exhausting senna leaves, in No. 40 powder, with 49 per cent. alcohol, after previous percolation with 95 per cent. alcohol,

**EXTRACTUM STRAMONII.**

## EXTRACT OF STRAMONIUM.

Stramonium Seeds, in No. 40 power ... 100·00

Alcohol (70 per cent), a sufficient quantity.

Exhaust the drug by slow percolation with the alcohol, recover most of the alcohol by distillation, and concentrate the percolate to a firm extract.

Extract of stramonium has similar properties to extract of belladonna. It is given in pills, in combination with other anti-asthmatics.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain)

*NOTES.*—Extractum Stramonii, U.S.P., is prepared by evaporating to a pilular consistence Fluidextractum Stramonii, which contains 0·35 per cent. w/v of alkaloids, and adjusting the strength by the addition of milk sugar, if necessary, so that the extract shall contain 1·4 per cent. of alkalis. The liquid extract is prepared by exhausting stramonium, in No. 40 power with 64 per cent. alcohol, and standardising.

**EXTRACTUM STRAMONII EXICCATUM.**

## DRIED EXTRACT OF STRAMONIUM.

*Synonyms.*—Extractum Stramonii Foliorum Exiccatum; Dried Extract of Stramonium Leaves

Stramonium Leaves, in No. 40 powder ... 100·00

Alcohol (70 per cent.) a sufficient quantity.

Moisten the drug with 25 of the alcohol, pack in a percolator, and percolate till 400 are obtained. Press the marc, mix the liquids, and filter. Assay the filtrate for dry extract and for alkaloid. Having thus ascertained the amount of extract that the remainder of the filtrate will yield and the amount of alkaloid that will be contained in it, calculate the quantity of powdered stramonium leaves of known alkaloidal value that must be added to reduce the alkaloidal value of the extract to 1 per cent. Add rather less than this quantity of powdered leaves to the remainder of the filtrate. Recover the alcohol by distillation, and dry the residue in a current of warm air from 60° to 80° until the weight is fairly constant. Calculate the additional weight of diluent required, and add to the product. Transfer the whole to a warm mortar, triturate until well mixed and pass through a No. 20 sieve.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTES.*—Dried extract of stramonium must be kept in well-stoppered bottles and stored in a cool, dry place. The extract is hygroscopic, and to counteract this it is desirable to use as diluent a powdered leaf of such high alkaloidal content that the finished product will contain at least two of diluent to one of extract.

**EXTRACTUM STROPHANTHI.**

## EXTRACT OF STROPHANTHUS.

Strophanthus Seeds, in No. 30 powder ... 50·00

Purified Ether, a sufficient quantity.

Alcohol, a sufficient quantity.

Milk Sugar, in powder, sufficient to produce... 100·00

Dry the powdered <sup>*strophanthus*</sup> ~~stramonium~~ seeds at 43°, pack in a percolator, moisten with ether, allow to macerate for twenty-four hours, then percolate with ether until it passes through uncoloured. Dry the marc at a temperature not exceeding 49°, reduce it to powder, moisten with the alcohol, allow to macerate for forty-eight hours, then allow percolation to proceed slowly until the product measures 500. Remove most of the alcohol by distillation or evaporation, concentrate the residue until it begins to thicken, and mix with sufficient finely-powdered milk sugar to make up the required weight of powdered extract.

Extract of strophanthus, when ordered in pills, may be rubbed with a little powdered liquorice and massed with syrup of glucose.

*Dose*.—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTE*.—It is officially directed that the powder, after treatment with ether, should be repacked in the percolator and then moistened with the alcohol, but it is better to moisten the drug before placing it in the percolator.

## <sup>*um*</sup> EXTRACTUM SUPRARENALIS LIQUIDUM.

LIQUID EXTRACT OF SUPRRENALS.

Suprarenal Glands of the Sheep or Ox, by

weight	... ..	100·00
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Distilled Water, a sufficient quantity.

Glycerin, sufficient to produce...	... ..	100·00
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Trim, slice, and bruise the glands; then add glycerin, 75, macerate for twenty-four hours, and strain through linen, pressing strongly. Finally, increase the volume of the product to 100 by the addition of glycerin mixed with an equal volume of recently boiled and cooled distilled water.

This extract may be given internally for the same purposes as the active principle adrenine, and is preferred by some practitioners as representing the whole gland. For its vaso-constrictor action it is used in suppositories for hæmorrhoids (3 to 5 minims in each), as ointment (10 per cent.), and as spray solution for the nose and throat (10 per cent.).

*Dose*.—3 to 10 decimils (5 to 15 minims).

## EXTRACTUM TARAXACI.

EXTRACT OF TARAXACUM.

*Synonym*.—Extract of Dandelion.

Taraxacum Root, fresh	... ..	100·00
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Express the juice from the crushed root, allow it to settle, and heat the clear liquid to 100°, maintaining the temperature for ten minutes; then strain and evaporate to a soft extract.

Extract of taraxacum is used as a constituent of confections, with confection of senna and confection of pepper. If very stiff the extract may be thinned with a little hot water to facilitate admixture. The solid extract is sometimes ordered in mixtures, when it must be dissolved in a mortar with a little hot water. As a pill excipient extract of taraxacum has good binding properties;



but the extract is liable to ferment and become acid, and pills prepared therewith sometimes deteriorate on this account.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

NOTE.—Extractum Taraxaci, U.S.P., is prepared by exhausting dried taraxacum root, in No. 30 powder, with 16 per cent. alcohol, and evaporating to a pilular consistence.

### EXTRACTUM TARAXACI LIQUIDUM.

#### LIQUID EXTRACT OF TARAXACUM.

*Synonym.*—Liquid Extract of Dandelion.

Taraxacum Root, dried, in No. 20 powder	...	100·00
Alcohol (60 per cent.)	... ..	200·00
Distilled Water, sufficient to produce	...	100·00

Add the drug to the alcohol, allow to macerate for forty-eight hours, then express 50 of liquid. Macerate the residue with 200 of the water for forty-eight hours, express, and strain the liquid, and concentrate by evaporation to about 50. Finally, mix the two liquids, add, if necessary, sufficient distilled water to make up the required volume, and filter.

Liquid extract of taraxacum is used in mixtures as a bitter stomachic and “liver” stimulant, often with diluted nitro-hydrochloric acid and tincture of nux vomica; in reality it has no action on the liver. The extract prepared from the dried root is considered less active therapeutically than the solid extract of the fresh root.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

NOTE.—Fluidextractum Taraxaci, U.S.P., is prepared by exhausting dried taraxacum root, in No. 30 powder, with 49 per cent. alcohol, and contains 5 per cent. of solution of sodium hydroxide.

### EXTRACTUM THYMI LIQUIDUM.

#### LIQUID EXTRACT OF THYMUS.

Thymus Glands of the Calf, by weight	...	100·00
Distilled Water, a sufficient quantity.		
Glycerin, sufficient to produce...	... ..	100·00

Trim, slice, and bruise the glands; then add glycerin, 75, macerate for twenty-four hours, and strain through linen, pressing strongly. Finally, increase the volume of the product to 100 by the addition of glycerin mixed with an equal volume of recently boiled and cooled distilled water.

This extract has been given to improve nutrition in children, in rickets, and also in ex-ophthalmic goitre. It should be dispensed as drops, or diluted with a mixture of glycerin and chloroform water in equal quantities.

*Dose.*—3 to 10 decimils (5 to 15 minims).

### EXTRACTUM THYROIDEI LIQUIDUM.

#### LIQUID EXTRACT OF THYROID.

Thyroid Glands of the Sheep, by weight	...	100·00
Distilled Water, a sufficient quantity.		
Glycerin, sufficient to produce...	... ..	100·00

Trim, slice, and bruise the glands; then add glycerin, 75, macerate for twenty-four hours, and strain through linen, pressing strongly. Finally, increase the volume of the product to 100 by the addition of glycerin mixed with an equal volume of recently boiled and cooled distilled water.

This preparation is an improvement upon *Liquor Thyroidei*, which it resembles in its medicinal properties.

*Dose*.—3 to 10 decimils (5 to 15 minims).

### EXTRACTUM VALERIANÆ.

EXTRACT OF VALERIAN.

Valerian Rhizome, in No. 40 powder ... 100·00

Alcohol (70 per cent.) a sufficient quantity.

Moisten the drug with the alcohol, pack in a percolator, cover the powder with more of the alcohol, allow to macerate for forty-eight hours, and exhaust by percolation; then recover most of the alcohol by distillation, and evaporate the residue to a firm extract.

*Dose*.—6 to 30 centigrams (1 to 5 grains).

### EXTRACTUM VALERIANÆ LIQUIDUM.

LIQUID EXTRACT OF VALERIAN.

Valerian Rhizome, in No. 40 powder ... 100·00

Alcohol (70 per cent.), sufficient to produce... 100·00

Moisten the drug with 30 of the alcohol, pack in a percolator, saturate the mass with alcohol, set aside for forty-eight hours, then exhaust by percolation with the alcohol. Reserve the first 85 of percolate, recover most of the alcohol from the subsequent percolate, evaporate the residue to a soft extract, dissolve this in the reserved percolate, and add sufficient of the alcohol to make up the required volume.

*Dose*.—1 to 4 mls (15 to 60 minims).

NOTE.—This preparation corresponds to *Fluidextractum Valerianæ*, U.S.P.

### EXTRACTUM VIBURNI PRUNIFOLII.

EXTRACT OF BLACK HAW.

*Synonym*.—Extract of *Viburnum Prunifolium*.

Black Haw, in No. 60 powder ... 100·00

Alcohol (70 per cent.), a sufficient quantity.

Moisten the drug with the alcohol, pack in a percolator, cover the powder with more of the alcohol, allow to macerate for forty-eight hours, and exhaust by percolation; then recover most of the alcohol by distillation, and evaporate the residue to a firm extract.

This extract may be given in pills or gelatin capsules, as a uterine sedative in dysmenorrhœa and threatened abortion. It is often combined with *apiol*, *ergot*, or *hydrastis*.

*Dose*.—2 to 5 decigrams (3 to 8 grains).

**EXTRACTUM VIBURNI PRUNIFOLII LIQUIDUM.**

LIQUID EXTRACT OF BLACK HAW.

*Synonym.*—Liquid Extract of Viburnum Prunifolium.

Black Haw, in No. 60 powder ... .. 100·00

Alcohol (70 per cent.), sufficient to produce ... 100·00

Add 40 of the alcohol to the powdered drug, pack in a percolator, saturate the mass with alcohol, allow to macerate for forty-eight hours, then exhaust by percolation. Reserve the first 85 of percolate, distil off most of the alcohol from the subsequent percolate, evaporate the residue to a soft extract, dissolve this in the reserved percolate, and add sufficient of the alcohol to make up the required volume.

Liquid extract of black haw is official in India, the Eastern Colonies, and the North American Colonies. It may conveniently be given as Elixir Viburni Prunifolii Composita.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

*NOTE.*—Fluidextractum Viburni Prunifolii, U.S.P., is prepared by exhausting the drug in No. 40 powder, with 64 per cent. alcohol.

**FARINA TRITICI.**

WHEATEN FLOUR.

Wheaten flour consists of the grain of *Triticum sativum*, Lam. (N.O. Gramineæ), ground and sifted.

It occurs as a white inodorous powder containing starch, gluten, albumen, gum, etc.

Wheaten flour is occasionally used in pharmacy, in dusting powders for irritable conditions of the skin. Where there is exudation, wheaten starch is preferable to the crude flour containing gluten and gummy matters.

**FEL BOVINUM.**

OX BILE.

*Synonyms.*—Fel Bovis; Ox Gall.

Ox bile is obtained from *Bos taurus*, Linn. (Order Ungulata), and should be used fresh.

It occurs as a brownish or dark green, somewhat viscid liquid, with a disagreeable odour, and unpleasant bitter taste. Specific gravity, 1·018 to 1·028 (about 1·015 to 1·025 at 25°). It is neutral or faintly alkaline to litmus. If a drop of a freshly prepared aqueous solution of sugar (1 to 4 of water) be added to a mixture of 2 drops of fresh ox bile and 10 mls of distilled water, the subsequent cautious addition of sulphuric acid until the precipitate first formed is redissolved causes the mixture to acquire a reddish colour, which changes to carmine, purple, and violet successively.

The chief constituents of ox bile are the bile salts, sodium glycocholate and taurocholate, and the bile pigments, bilirubin,



biliverdin, etc.; a mucinoid substance (nucleo-proteid) is also present, together with small quantities of lecithin, cholesterin, fats, soaps, urea, and mineral salts, of which the most important are sodium chloride, and calcium, iron, and magnesium phosphates. The colour reaction (Pettenkofer's test) described in the preceding paragraph is based upon the formation of furfuraldehyde by the action of the sulphuric acid on the sugar, and the production of cholalic acid by hydrolysis from the acids in the bile salts; the furfuraldehyde gives a brilliant purple colour with cholalic acid.

Ox bile is used chiefly in the form of *Fel Bovinum Purificatum*, but it can also be obtained as a dry powder (*Fel Bovinum Exsiccatum*), which is given in cachets, in doses of 3 to 6 decigrams (5 to 10 grains).

### FEL BOVINUM PURIFICATUM.

#### PURIFIED OX BILE.

*Synonym.*—*Fel Bovis Purificatum*; Purified Ox Gall.

Fresh Ox Bile ... .. 100·00

Alcohol, a sufficient quantity.

Concentrate the ox bile by evaporation to 25, and shake with 50 of the alcohol; then set the mixture aside until clear, decant the clear liquid, filter the remainder, and wash the residue by passing a little alcohol through the filter. Mix the liquids, recover most of the alcohol by distillation, and evaporate the residue on a water-bath to a thick extract.

It occurs as a yellowish-green or yellowish-brown thick extract, having a taste partly sweet and partly bitter, and a peculiar odour. Very soluble in water and alcohol, but insoluble in ether. An aqueous solution should remain clear when mixed with an equal volume of alcohol, showing the absence of unpurified ox bile. If a drop of a freshly prepared aqueous solution of sugar (1 to 4 of water) be added to 10 mils of a 1 to 5 per cent. aqueous solution of purified ox bile, the subsequent cautious addition of sulphuric acid until the precipitate first formed redissolves causes the mixture to acquire gradually a reddish colour, which changes to carmine, purple, and violet successively.

Purified ox bile is an intestinal antiseptic, cholagogue, and laxative. It assists the action of the pancreatic secretion upon proteids and fats. It is given medicinally where there is a natural deficiency of bile, being best given in capsules coated with keratin, or treated with solution of formaldehyde; it may also be given in keratin-coated pills. Ox bile increases peristalsis slightly, and an enema is sometimes used, containing 12 decigrams (20 grains) in 60 mils (2 fluid ounces) of warm water to remove impacted fæces. Bile assists the action of such purgatives as aloes, jalap, and rhubarb.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

*NOTE.*—Purified ox bile darkens with age and by exposure to air.

**FERRI ALBUMINAS.****IRON ALBUMINATE.**

Iron albuminate may be prepared by dissolving 35 of dry egg-albumen in 1000 of water at a temperature under  $50^{\circ}$ , filtering, and adding the solution to 120 of dialysed solution of iron; the mixture is then neutralised with sodium hydroxide, and the precipitate formed washed until free from chlorine, drained, pressed, and spread out to dry.

It occurs as a brown powder. Insoluble in water, but soluble in diluted acids and alkalis. It contains about 15 per cent. of ferric oxide. The substance known in commerce as "albuminate of iron" corresponds in strength to only 5 per cent. of ferric oxide, and contains a small quantity of acid or alkali, added to render the preparation soluble in water. It occurs either as a brown powder or in brown scales, the latter being prepared by dissolving the iron albuminate in citric acid, spreading the solution on glass, drying, and scaling. The substance known as "saccharated albuminate of iron" is a mixture of saccharated ferric oxide and egg albumen.

Iron albuminate has the general properties of the organic salts of iron. It has been specially recommended as a hæmatinic in anæmias associated with gastric symptoms. Iron albuminate in solid form is best given in cachets. The commercial preparations vary in their solubility; when desired in liquid form, *Liquor Ferri Albuminatis* should be prescribed.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

**FERRI ARSENAS.****IRON ARSENATE.**

*Synonym.*—Arseniate of Iron.

Iron arsenate is prepared by the following process:—Dissolve 41.5 of ferrous sulphate in about 240 of boiling distilled water, and 53 of sodium arsenate in about 200 of boiling water, then mix the two solutions. Dissolve 9 of sodium bicarbonate in a little cold water, add the solution to the hot mixture, and stir thoroughly. Wash the precipitate formed on a calico filter until free from sulphates, remove most of the water it contains by pressure between folds of strong linen, and dry at a temperature not exceeding  $37.5^{\circ}$ . The product consists of ferrous arsenate,  $\text{Fe}_3(\text{AsO}_4)_2, 6\text{H}_2\text{O}$ , with ferric arsenate and some ferric oxide.

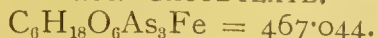
It occurs as a greenish, amorphous, tasteless powder. Insoluble in water, but readily soluble in hydrochloric acid. It should be free from sulphates, and contain about 10 per cent. of anhydrous ferrous arsenate.

The medicinal properties of iron arsenate are principally those of the arsenic ion; the amount of iron in each dose is small. The salt is best given in pill form, being well triturated with a little milk sugar, and massed with syrup of glucose. A so-called "soluble iron arsenate" is prepared for hypodermic use (see *Ferri Arsenio-Citras Ammoniat*us).

*Dose.*—4 to 16 milligrams ( $\frac{1}{16}$  to  $\frac{1}{4}$  grain).

**FERRI CACODYLAS.**

IRON CACODYLATE.

*Synonym.*—Ferric Cacodylate.

Iron cacodylate,  $[(\text{CH}_3)_2\text{AsO}_2]_3\text{Fe}$ , may be obtained by the interaction of barium cacodylate and ferric sulphate.

It occurs as a yellowish, amorphous powder. Soluble in water (1 in 15), but almost insoluble in alcohol. It contains 17.11 per cent. of iron oxide, and the equivalent of 63.58 per cent. of arsenious oxide.

Although cacodylic acid contains 70 per cent. of arsenic, it is practically non-poisonous, since the arsenic is in organic combination, and arsenic ions are set free only to a very limited extent. Iron cacodylate therefore allows the administration of a reasonable dose of iron in combination with a non-poisonous dose of arsenic. It has been recommended in anæmias and in such skin diseases as lichen, acne, and lupus. Iron cacodylate is given in pill form, generally in doses of 15 to 30 milligrams ( $\frac{1}{4}$  to  $\frac{1}{2}$  grain) three times daily, and by hypodermic injection, daily doses of 45 milligrams in 1 mil ( $\frac{3}{4}$  grain in 15 minims) of distilled water being injected deeply into the gluteal region. Pills may be prepared by triturating the cacodylate with milk sugar, and massing with syrup of glucose.

*Dose.*— $\frac{1}{2}$  to 3 decigrams ( $\frac{3}{4}$  to 5 grains) daily; hypodermically,  $\frac{1}{2}$  to 1 decigram ( $\frac{3}{4}$  to 1½ grains) daily.

**FERRI CARBONAS EFFERVESCENS.**

EFFERVESCENT IRON CARBONATE.

*Synonym.*—Effervescent Ferrous Carbonate.

Ferrous Sulphate, in powder	...	...	5.00
Sodium Bicarbonate, in powder	...	...	50.00
Tartaric Acid, in powder	...	...	24.00
Citric Acid, in powder	...	...	14.00
Refined Sugar, in powder	...	...	20.00

Mix and granulate the ingredients, as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—2 to 4 grammes (30 to 60 grains).

NOTE.—Effervescent ferrous carbonate should be kept in well-stoppered bottles protected from the light.

**FERRI CARBONAS SACCHARATUS.**

SACCHARATED IRON CARBONATE.

*Synonym.*—Saccharated Ferrous Carbonate.

Saccharated iron carbonate is prepared by the following process:—Dissolve 40 of ferrous sulphate in 1600 of boiling distilled water, and 25 of ammonium carbonate in the same quantity of distilled water at 60° to 80°; then add the solution of ferrous sulphate to the solution of ammonium carbonate, stirring briskly meanwhile. Set the mixture aside in a deep, covered vessel for twenty-four hours, then remove the clear liquid, add to the precipitate 3200 of boiling



distilled water, stir, and allow the precipitate to settle. Again remove the clear liquid, collect the precipitate on a calico filter, press to remove water, mix it with 20 of refined sugar, and dry at a temperature not exceeding  $100^{\circ}$ . The product contains ferrous oxycarbonate,  $x\text{FeCO}_3$ ,  $y\text{Fe(OH)}_2$ , more or less oxidised.

It occurs as a brownish-grey powder, or in small coherent lumps, and has a sweet, slightly ferruginous taste. Soluble in warm diluted hydrochloric acid diluted with 50 per cent. of water, solution being accompanied by effervescence. It should be almost free from sulphates, and contain the equivalent of about one-third its weight of ferrous carbonate.

Saccharated iron carbonate is a non-astringent chalybeate, having the general properties of iron salts (see Ferri Sulphas). It is suitable for children, and may be given to them in small doses spread between slices of buttered bread. It may also be dispensed in the form of cachets or pills, or in lozenges prepared to contain 3 to 6 decigrams (5 to 10 grains) or more in each. *Mistura Ferri Composita* and *Pilula Ferri* are active preparations of iron carbonate.

*Dose*.— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

*NOTES*.—Saccharated iron carbonate should be kept in well-stoppered bottles protected from the light. *Ferri Carbonas cum Glucoso*, a preparation which contains twice as much ferrous carbonate as the above preparation, and keeps better, is prepared by dissolving 26 of ferrous sulphate and 4 by weight of liquid glucose in 80 of distilled water, adding the mixture to a solution of 28 of sodium carbonate in 40 of distilled water, with constant stirring, then adding 120 of distilled water, again stirring, and allowing to settle; after twice washing with 160 of distilled water, the precipitate is mixed with 4 by weight of liquid glucose, then evaporated on a steam-bath, dried quickly in a drying chamber, and reduced to fine powder. The ferrous carbonate with glucose is suitable for dispensing in capsules, 9 of the saccharated carbonate being mixed with 2 of soft paraffin, and 4 of liquid paraffin, so that  $2\frac{1}{2}$  grains of the mass is equivalent to one Bland's pill.

## FERRI CITRAS.

IRON CITRATE.

*Synonym*.—Ferric Citrate.

Iron citrate is prepared by the following process:—Mix 160 of solution of ammonia with 400 of distilled water, and add slowly, and with constant stirring, 100 of solution of ferric sulphate, also previously diluted with 400 of distilled water. Take care that the ammonia is finally in slight excess, and set the mixture aside for two hours, stirring occasionally; then pour on a calico filter, allow the precipitate to drain, and wash with distilled water until free from sulphates. Again allow the precipitated ferric hydroxide to drain, add it to 40 of citric acid, previously dissolved in its own weight of distilled water, and heat the mixture on a water-bath to  $60^{\circ}$ , stirring constantly until the precipitate is dissolved. Lastly, filter the liquid, evaporate it on a water-bath, at a temperature not exceeding  $60^{\circ}$ , to the consistence of syrup, and spread it on porcelain tiles or sheets of glass, so that, when dry, the iron citrate may be obtained in scales.

It occurs in thin, transparent scales of a garnet-red colour, with a slightly ferruginous taste, and containing ferric citrate corresponding to not less than 16 per cent. of metallic iron. Slowly soluble in cold water, more readily soluble in hot water, the solubility diminishing with age; insoluble in alcohol. The aqueous solution has an acid reaction. It contains variable proportions of water, and becomes anhydrous at 100°. Incinerated with free access of air, ferric citrate leaves a residue of ferric oxide, which is not alkaline to litmus (absence of fixed alkali). It should give no odour of ammonia on heating with solution of potassium or sodium hydroxide.

Iron citrate has properties similar to those of iron and ammonium citrate, but contains a rather smaller percentage of iron, and, being more permanent in air, it may be dispensed in cachets. It is specially suitable for use in acid solutions.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

*NOTE.*—Iron citrate should be kept in well-stoppered bottles protected from the light.

### FERRI CITRO-ARSENIAS AMMONIATUS.

AMMONIATED CITRO-ARSENATE OF IRON.

*Synonym.*—Soluble Iron Arsenate.

Ammoniated citro-arsenate of iron is said to be a double salt of ferrous arsenate and ammonium citrate.

It occurs in green or yellowish-green, deliquescent scales. Very soluble in water. It contains from 15 to 18 per cent. of metallic iron, and the equivalent of 1.4 per cent. of arsenious anhydride.

On account of its ready solubility, this salt is used for hypodermic injection as an antiperiodic in the treatment of malaria, also in pernicious anæmia, and generally for the administration of iron and arsenic hypodermically. A single large dose of 25 milligrams ( $\frac{2}{5}$  grain) may be injected every third day.

*Dose.*—2 to 6 milligrams ( $\frac{1}{40}$  to  $\frac{1}{10}$  grain).

### FERRI ET AMMONII CITRAS.

IRON AND AMMONIUM CITRATE.

Iron and ammonium citrate is prepared by the following process:—Dilute 160 of solution of ammonia with 400 of distilled water, and add gradually, with constant stirring, 100 of solution of ferric sulphate, also diluted with 400 of water, taking care that the ammonia is finally in slight excess. Set aside for two hours, stirring occasionally, then filter through calico, wash the precipitate with water until free from sulphates, drain it well, and add it to 40 of citric acid previously dissolved in its own weight of water on a water-bath, stirring until the ferric hydroxide is almost entirely dissolved, or until the acid is saturated with ferric hydroxide, more of the latter being prepared, if required, from solution of ferric sulphate. After the solution has cooled add 55 of solution of ammonia and filter through flannel, adding water if necessary, then evaporate to a thin syrup, main-

taining a very slight excess of ammonia, scale on porcelain tiles or sheets of glass at a temperature not exceeding 38°, and transfer the dry product to well-closed vessels.

It occurs in thin, transparent scales of a garnet-red colour, with a slightly ferruginous taste. The scales are deliquescent in moist air. Soluble in water (2 in 1), but almost insoluble in alcohol. Incinerated with free access of air, it leaves 31 or 32 per cent. of ferric oxide, which is not alkaline to litmus (absence of fixed alkali). It should be free from tartrates and almost free from sulphates.

Iron and ammonium citrate has the general properties of iron salts (see *Ferri Sulphas*). It possesses little astringency, and is often well borne when astringent preparations of iron disagree. It is best prescribed in mixture form, flavoured with syrup of orange and chloroform water. Without chloroform water or spirituous tinctures, solutions of iron and ammonium citrate do not keep well. It is precipitated by mineral acids, fixed alkalies, and vegetable astringents. Iron and ammonium citrate may be made into pills with a small quantity of alcohol, working the mass quickly. For the preparation of hypodermic solutions the green (acid) variety is preferred (see *Ferri et Ammonii Citras Viridis*). For filling into capsules, iron ammonium citrate is reduced to fine powder and mixed with soft paraffin; or a saturated solution of the salt, emulsified with a mixture of wool fat and soft paraffin, may be used.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

*NOTE*.—Iron and ammonium citrate should be kept in well-stoppered bottles protected from the light.

### FERRI ET AMMONII CITRAS EFFERVESCENS.

#### EFFERVESCENT IRON AND AMMONIUM CITRATE.

Iron and Ammonium Citrate, in fine powder ...	5.00
Sodium Bicarbonate, in powder ... ..	46.00
Tartaric Acid, in powder ... ..	24.00
Citric Acid, in powder ... ..	17.50
Refined Sugar, in powder ... ..	17.50

Rub the iron and ammonium citrate with the sugar, then mix and granulate the ingredients as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100 and contain about 5 per cent. of iron and ammonium citrate.

*Dose*.—6 to 12 grammes (90 to 180 grains).

### FERRI ET AMMONII CITRAS VIRIDIS.

#### GREEN IRON AND AMMONIUM CITRATE.

Green iron and ammonium citrate is made in the same way as ordinary iron and ammonium citrate, but a larger proportion of citric acid is used, and only sufficient ammonia is added to produce a green solution.

It occurs in green deliquescent scales which, on ignition, leave



from 18.5 to 20 per cent. of ferric oxide. In other respects it has the characters of *Ferri et Ammonii Citras*. Its solution is slightly acid in reaction.

Green iron and ammonium citrate is a suitable form for the hypodermic administration of iron. A 4 per cent. solution in sterilised distilled water may be injected deeply, in doses of  $\frac{1}{2}$  to 1 mil (7 to 15 minims), every second or third day. If an addition of 0.5 per cent. of sodium arsenate be made to the solution, it will resemble Zambeletti's fluid. These solutions have been found useful in pernicious anæmia and malaria.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

*NOTE*.—Green iron and ammonium citrate is used chiefly for photographic purposes.

### FERRI ET QUININÆ CITRAS.

#### IRON AND QUININE CITRATE.

*Synonyms*.—*Ferri et Quininæ Citras Solubilis*; Soluble Iron and Quinine Citrate.

Iron and quinine citrate is prepared by the following process:—Dilute 90 of solution of ferric sulphate with four times its volume of distilled water, and prepare therefrom ferric hydroxide, as directed in the case of *Ferri et Ammonii Citras*. Add 20 of quinine sulphate to 160 of distilled water, dissolve it by means of 30 of diluted sulphuric acid, precipitate the alkaloid from the solution by adding solution of ammonia in slight excess, and wash the precipitate on a filter with 600 of distilled water. Dissolve 61.5 of citric acid in its own weight of water on a water-bath, add the precipitated ferric hydroxide, and stir until the ferric hydroxide is dissolved. Next, add the precipitated quinine to the warm iron solution, stir till dissolved, cool the liquid, and add gradually 30 of solution of ammonia diluted with 40 of distilled water, stirring continually so as to effect solution of the quinine which separates with each addition of ammonia. Finally; filter the liquid, evaporate it to a thin syrup, scale on porcelain tiles or sheets of glass, at a temperature not exceeding 38°, and transfer the dry product to well-closed vessels.

It occurs in thin, transparent, deliquescent, greenish, golden-yellow scales, which are bitter and mildly ferruginous in taste. Soluble in water (1 in 2). Determined gravimetrically, it should yield 15 per cent. of anhydrous quinine. Incinerated with free access of air it leaves a residue which is not alkaline to litmus (absence of fixed alkali).

Iron and quinine citrate is a bitter chalybeate having the general properties of iron and quinine, and is much used as a "tonic" and stomachic. It may be given in mixtures flavoured with syrup of orange or syrup of lemon and chloroform water, or in pills massed quickly with a sufficient quantity of alcohol. It is often prescribed with arsenic or strychnine, when the acid solution of arsenic should be used. A scale preparation of iron, quinine, and strychnine citrate is

made containing 1 per cent. of strychnine, and is given in doses of 1 to 3 decigrams (2 to 5 grains). Iron and quinine citrate should not be prescribed with alkalies, alkaline carbonates and citrates, or vegetable astringents. For filling into capsules, iron and quinine citrate may be treated in the same way as iron and ammonium citrate.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTE.—Iron and quinine citrate should be kept in well-stoppered bottles protected from the light.

## FERRI ET QUININÆ CITRAS EFFERVESCENS.

EFFERVESCENT IRON AND QUININE CITRATE.

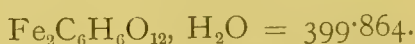
Iron and Quinine Citrate, in fine powder	...	...	5.00
Sodium Bicarbonate, in powder	...	...	46.00
Tartaric Acid, in powder	...	...	24.00
Citric Acid, in powder	...	...	17.50
Refined Sugar, in powder	...	...	17.50

Rub the iron and quinine citrate with the sugar, then mix and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100 and contain about 5 per cent. of iron and quinine citrate.

*Dose.*—4 to 8 grammes (60 to 120 grains).

## FERRI FORMAS.

IRON FORMATE.



*Synonym.*—Ferric Formate.

Iron formate,  $\text{Fe}_2(\text{COOH})_6, \text{H}_2\text{O}$ , may be prepared by digesting recently precipitated, moist ferric hydroxide in aqueous formic acid solution for several days, evaporating the resulting red-brown solution at about  $70^\circ$ , and drying the residue at  $40^\circ$ .

It occurs in the form of flaky red crystals, or as a light, loosely coherent reddish powder. Soluble in water, but only very slightly soluble in alcohol.

Iron formate has the hæmatinic properties of other iron salts. The formic radical exerts a "tonic" action upon muscular tissue (see *Sodii Formas*), but the dose of iron formate usually given is insufficient to produce this effect.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

NOTE.—Ferrous formate,  $\text{Fe}(\text{COOH})_2$ , occurs in the form of green crystals, which are only very slightly soluble in water, and insoluble in alcohol.

**FERRI GLYCEROPHOSPHAS.**

IRON GLYCEROPHOSPHATE.

*Synonym.*—Ferric Glycerophosphate.

Iron glycerophosphate may be obtained by adding solution of ferric sulphate to solution of barium glycerophosphate, prepared by heating a mixture of glycerin and phosphoric acid to a temperature not exceeding  $110^{\circ}$ , and adding excess of barium carbonate, the solution of iron glycerophosphate being subsequently filtered and evaporated. Another method of preparation is to dissolve ferric hydroxide in glycerophosphoric acid, and evaporate the solution.

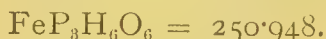
The salt occurs as a yellowish powder, or in yellow scales. Slightly soluble in cold water.

Iron glycerophosphate has been recommended to improve nerve-nutrition in neurasthenic conditions, also in chlorosis and other anæmias. The glycerophosphate portion has no action of value. It is contained in the compound syrup of the glycerophosphates, and may be dispensed in pills with extract of cinchona and powdered rhubarb, as a tonic stomachic, or in cachets.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**FERRI HYPOPHOSPHIS.**

IRON HYPOPHOSPHITE.

*Synonym.*—Ferric Hypophosphite.

Iron hypophosphite,  $\text{Fe}(\text{PH}_2\text{O}_2)_3$ , may be prepared by adding a solution of sodium hypophosphite to a solution of ferric chloride containing as little free acid as possible, washing, and drying at a moderate heat.

It occurs as a white or greyish-white powder, odourless, and nearly tasteless. Slightly soluble in water, more readily in presence of hypophosphorous acid, and, when freshly prepared, in a warm concentrated solution of alkali citrate, forming with the last named a green solution. On ignition it leaves a residue of ferric pyrophosphate. It should be free from phosphates, carbonates, calcium and metallic impurities generally.

Iron hypophosphite has the hæmatinic properties of iron salts generally, and is used in combination with other salts of the same acid in wasting diseases, such as rickets and tuberculosis. The hypophosphite has no advantage over other iron salts, since it is absorbed and excreted as such. It is a constituent of compound syrup of the hypophosphites, and may be given in pills, massed with syrup of glucose, or in cachets mixed with calcium hypophosphite and powdered nux vomica.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

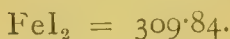
*NOTES.*—Iron hypophosphite should be distinguished from the ferrous hypophosphite formerly used in the preparation of hypophosphite syrups.



Solutions of the ferric salt in alkaline citrate have a pale green colour and are permanent. The ferrous salt formed a nearly colourless syrup, which was prone to deposit, owing to oxidation.

### FERRI IODIDUM.

IRON IODIDE.



*Synonym.*—Ferrous Iodide.

Ferrous iodide,  $\text{FeI}_2$ , may be prepared by mixing 6 of iron with 17 of iodine and 20 of water, controlling the heat developed as combination takes place, so as to avoid loss of iodine, and, when the reaction is complete, heating until the solution becomes pale green. The solution is filtered while hot and rapidly evaporated in a clean iron vessel until it solidifies on cooling. When solid it should be transferred at once to a well-closed bottle.

It occurs, when freshly made and anhydrous, as a white deliquescent crystalline mass, but usually it is steel-grey or reddish-brown from the presence of oxide. Readily soluble in water, forming a green-coloured solution; soluble also in glycerin and alcohol. It melts at about  $177^\circ$ , giving off vapours of iodine.

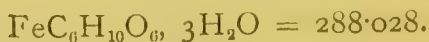
Ferrous iodide has the general properties of iron and of iodine. It is used especially in tuberculous and syphilitic conditions, and is best given in the form of Syrupus Ferri Iodidi. This syrup may be represented in capsule form, in the same way as Easton's syrup; but, on account of the instability of ferrous iodide, it is better to prepare the salt as required in as strong solution as possible, and to emulsify this solution with a mixture of wool fat and soft paraffin, the volume being adjusted so that 6 decimils (10 minims) may represent 4 mils (1 fluid drachm) of the syrup. If required in solid form, Pilula Ferri Iodidi is the best preparation; or the pure salt may be rubbed with liquorice powder and massed with syrup.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTE.*—Ferrous iodide should be preserved in small well-stoppered bottles.

### FERRI LACTAS.

IRON LACTATE.



*Synonym.*—Ferrous Lactate.

Ferrous lactate,  $\text{Fe}(\text{C}_3\text{H}_5\text{O}_3)_2, 3\text{H}_2\text{O}$ , may be prepared by digesting iron filings with lactic acid until action ceases, then filtering, and crystallising; or by decomposing a solution of calcium lactate with a solution of ferrous sulphate, filtering, removing residual calcium sulphate from the filtrate by means of alcohol, again filtering, evaporating, and crystallising.

It occurs as a greenish-white crystalline powder, or in small needle-shaped crystals and crystalline masses. It is a characteristic, but

not strongly marked, odour, and a sweet and mild chalybeate taste. Slowly soluble in water (1 in 40), more soluble in boiling water (1 in 12), freely soluble with formation of a green colour in solutions of alkali citrates, and almost insoluble in alcohol, though it may be crystallised from hot diluted alcohol. The solutions have a slightly acid reaction. On heating it becomes brown, then black, and froths, giving off white acid vapours having an odour of burnt sugar, finally leaving a residue of 27·74 per cent. of ferric oxide. It should be free from sulphates, chlorides, carbonates, sugar, and ferric salts.

Ferrous lactate has the general properties of iron salts (see *Ferri Sulphas*); it is very readily assimilated, and is one of the least astringent forms of iron. Pills may be prepared with extract of gentian or extract of cinchona. The powder may be given in cachets, combined, if so desired, with bismuth, pepsin, or nux vomica. Ferrous lactate is given to children as *Syrupus Calcii et Ferri Lactophosphatum*.

*Dose*.—1 to 6 decigrams (2 to 10 grains).

*NOTE*.—Ferrous lactate should be kept in well-stoppered bottles protected from the light.

## FERRI OXIDUM MAGNETICUM.

MAGNETIC IRON OXIDE.



*Synonyms*.—Ferroso-ferric Oxide; *Æthiops Martialis*; Black Oxide of Iron.

Magnetic iron oxide,  $\text{FeOFe}_2\text{O}_3$ , may be prepared by adding a solution containing molecular proportions of ferric and ferrous sulphates to solution of ammonia, boiling until the precipitate turns black, washing and drying at a low temperature.

It occurs as a black powder, insoluble in water and alcohol, but soluble in warm diluted acids. Dissolved in diluted sulphuric acid and titrated with standard solution of potassium permanganate, an amount of iron corresponding to at least 90 per cent. of  $\text{Fe}_3\text{O}_4$  should be indicated.

Magnetic iron oxide may be used in the same way as reduced iron.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

## FERRI OXIDUM SACCHARATUM.

SACCHARATED IRON OXIDE.

*Synonyms*.—Saccharated Ferric Oxide; Soluble Ferric Oxide.

Saccharated iron oxide may be prepared by dissolving 14·5 of iron perchloride in 165·5 of water, adding a solution of 26 of sodium carbonate in 150 of water, washing the precipitated ferric hydroxide, warming it till dissolved with 50 of refined sugar and a solution of

0.75 of sodium hydroxide in 4.5 of water, and evaporating to dryness.

It occurs as a reddish-brown powder, having a sweet, slightly ferruginous taste. Soluble in hot water (1 in 20) to a perfectly clear reddish-brown solution having only a slight alkaline reaction, and giving no precipitate with solution of potassium ferrocyanide unless previously acidified. It should yield only the slightest reactions with the tests for chlorides and sulphates, and contain not less than 2.8 per cent. of iron.

Saccharated iron oxide may be given in cachets, or the powder taken spread on bread and butter. It is a mild chalybeate, easily assimilated. Given in repeated teaspoonful doses mixed with water it is an antidote to arsenical poisoning.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

NOTES.—This preparation corresponds to Ferrum Oxydatum Saccharatum of the German and Austrian Pharmacopœias. A stronger preparation, containing 10 cent. of iron, is obtainable in commerce.

## FERRI PEPTONAS.

IRON PEPTONATE.

*Synonym.*—Ferric Peptonate.

Iron peptonate may be prepared by adding solution of dialysed iron in a thin stream and with constant stirring to solution of peptone, exactly neutralising with sodium hydroxide, collecting, and washing the precipitate until free from chlorides, dissolving it in a little water by the aid of hydrochloric acid, evaporating, and spreading on glass plates to dry at about 55°. The product contains the equivalent of 25 to 30 per cent. of ferric oxide. By means of various diluents the above is reduced to a strength corresponding to 5 per cent. of ferric oxide, and this constitutes the commercial product.

It occurs as a brown powder, or in brown translucent scales, without ferruginous taste. Partly soluble in water.

Iron peptonate is dispensed in the form of cachets and powders, but more commonly the solution is employed (see Liquor Ferri Peptonatis).

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTE.—Ferri Peptonas Saccharatus is a mixture of saccharated iron oxide and iron peptonate.

## FERRI PERCHLORIDUM.

IRON PERCHLORIDE.



*Synonyms.*—Ferri Chloridum; Ferric Chloride.

Ferric chloride,  $\text{Fe}_2\text{Cl}_6, 12\text{H}_2\text{O}$ , may be prepared by evaporating at a gentle heat 500 of a slightly acidified solution of ferric chloride,



containing the equivalent of 12·5 of metallic iron, until it weighs 50, and setting aside in a warm place until a crystalline mass forms, when it is at once transferred to a well-stoppered bottle protected from the light.

It occurs as an orange-coloured, very deliquescent crystalline mass having a slight odour of hydrochloric acid and a very astringent metallic taste. Readily soluble in water, alcohol, ether, and glycerin. It melts at 35·5°, and at a higher temperature is partly decomposed and partly volatilised. A solution approximating in strength to *Liquor Ferri Perchloridi Fortis* may be prepared by dissolving 5 parts of ferric chloride in 2 parts of distilled water. If a glass rod moistened with solution of ammonia be brought near to the surface of a solution in water (1 in 1), no white fumes should be formed; similarly, a piece of paper dipped in zinc iodide and starch solution should not become coloured (limit of free hydrochloric acid and chlorine). It should be free from copper and sulphates and contain not more than traces of nitrates.

Iron perchloride has the general properties of iron salts (see *Ferri Sulphas*), and is powerfully astringent. It is usually given internally as *Liquor Ferri Perchloridi* or *Tinctura Ferri Perchloridi*, but for external use the crystalline salt is preferred, as solutions prepared therefrom are less acid. Iron perchloride acts as a powerful styptic when applied locally. As an astringent paint for the throat, a solution (1 in 8) in diluted glycerin is prepared; for use in a throat spray an aqueous solution (1 in 60) is employed. The chloride is used in the preparation of styptic wool and styptic lint; these contain 15 per cent. of the crystalline salt. Iron perchloride is incompatible with alkalies, alkaline carbonates, iodides, salicylates, and astringent infusions.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

*NOTES.*—Anhydrous ferric chloride ( $\text{Fe}_2\text{Cl}_6 = 324\cdot5$ ), formed as a sublimate by heating metallic iron in a stream of chlorine, occurs in dark greenish-brown crystals which are exceedingly deliquescent, uniting with the moisture to form the crystalline hydrate,  $\text{Fe}_2\text{Cl}_6, 12\text{H}_2\text{O}$ .

## FERRI PHOSPHAS.

### IRON PHOSPHATE.

Iron phosphate is prepared by dissolving 30 of ferrous sulphate and 27·5 of sodium phosphate separately, each in 300 of distilled water, allowing the two solutions to cool, and, when the temperature is between 38° and 55°, adding the sodium phosphate solution to the ferrous sulphate solution, together with a solution of 7·5 of sodium bicarbonate in a little distilled water. The resulting precipitate should be washed on a calico filter with hot distilled water, until free from sulphates, and dried at a temperature not exceeding 49°. The product consists of hydrous ferrous phosphate, with ferric phosphate and some iron oxide.

It occurs as a slate-blue powder. Insoluble in water, but soluble in hydrochloric acid. Determined volumetrically, not less than 47 per cent. of hydrous ferrous phosphate ( $\text{Fe}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O} = 502.828$ ) should be indicated. It should yield no reaction with the tests for arsenium.

Iron phosphate is a mild ferruginous tonic used especially in rickets, the anæmias of children, tuberculous disease, and neurasthenic conditions. It is largely prescribed in the form of Syrupus Ferri Phosphatis, Syrupus Ferri Phosphatis Compositus, and Syrupus Ferri Phosphatis cum Quinina et Strychnina. Iron phosphate may be given in powder form, enclosed in a cachet, or as a pill massed with syrup of glucose.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

*NOTE.*—Ferrous phosphate should be kept in well-stoppered bottles protected from the light.

### FERRI PHOSPHAS SOLUBILIS.

#### SOLUBLE IRON PHOSPHATE.

*Synonyms.*—Soluble Ferric Phosphate; Soluble Sodio-citro-ferric Phosphate.

Soluble iron phosphate is prepared by dissolving 50 of ferric citrate in 100 of distilled water, by heating on a water-bath, then adding 55 of sodium phosphate, stirring constantly until dissolved, evaporating the solution on a water-bath, at a temperature not exceeding  $60^\circ$ , to the consistence of a thick syrup, and spreading on plates of glass, so that, when dry, the salt may be obtained in scales.

It occurs in bright green transparent scales, without odour, and having an acidulous, slightly saline, taste. It becomes dark and discoloured on exposure to light. Freely and completely soluble in water, insoluble in alcohol. Potassium ferrocyanide gives no precipitate unless the solution is acidified. It should give no reaction with the tests for ammonia and pyrophosphates and should contain about 12 per cent. of metallic iron.

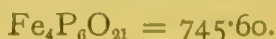
Soluble ferric phosphate dissolved in syrup is a much more permanent solution than the corresponding simple and compound syrups of ferrous phosphate, which continually deposit owing to oxidation of the ferrous salt to insoluble ferric phosphate.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

*NOTES.*—Soluble ferric phosphate should be kept in well-stoppered amber-coloured bottles. A similar compound is sometimes prepared with ammonium phosphate.

### FERRI PYROPHOSPHAS.

#### IRON PYROPHOSPHATE.



*Synonym.*—Ferric Pyrophosphate.

Iron pyrophosphate,  $\text{Fe}_4(\text{P}_2\text{O}_7)_3$ , may be prepared by the interaction of sodium pyrophosphate and ferric sulphate.

It occurs as a white powder insoluble in water, slightly soluble in water containing carbon dioxide in solution, and readily soluble in alkali citrates, forming green solutions.

When ordered in prescriptions the soluble form (*Ferri Pyrophosphas Solubilis*) is always required.

*Dose*.—1 to 5 decigrams (2 to 8 grains).

*NOTE*.—Iron pyrophosphate is affected by light, and should be kept in well-stoppered amber-coloured bottles.

## FERRI PYROPHOSPHAS SOLUBILIS.

SOLUBLE IRON PYROPHOSPHATE.

*Synonyms*.—Soluble Ferric Pyrophosphate; Sodio-citro-ferric Pyrophosphate.

Soluble iron pyrophosphate may be prepared by dissolving sodium pyrophosphate in a strong solution of an equal weight of ferric citrate, or by dissolving ferric pyrophosphate in a strong solution of sodium citrate, evaporating the solution at a temperature not exceeding 60° to a thick syrup, spreading on glass plates, and scaling.

It occurs in apple-green transparent scales, becoming dark and discoloured on exposure to light, without odour, having an acidulous, slightly saline taste, freely and completely soluble in water, insoluble in alcohol. Soluble iron pyrophosphate should be free from orthophosphates, and potassium ferrocyanide should give no precipitate unless the solution be acidified. It contains about 10 per cent. of metallic iron and a variable amount of water of hydration.

Iron pyrophosphate has the general properties of iron salts. It may be given in mixture form or in cachets. Solutions in water are fairly permanent, and may be mixed with the hypophosphites, with extract of malt or with cod-liver oil emulsions. A sterilised solution is suitable for hypodermic use, the daily dose being from 6 to 12 centigrams (1 to 2 grains).

*Dose*.—1 to 5 decigrams (2 to 8 grains).

*NOTE*.—Soluble iron pyrophosphate should be preserved in well-stoppered amber-coloured bottles. Similar compounds containing potassium or ammonium in place of all or part of the sodium are prepared and have similar properties.

## FERRI, QUININÆ, ET STRYCHNINÆ CITRAS.

IRON, QUININE, AND STRYCHNINE CITRATE.

Iron, quinine, and strychnine citrate may be prepared in the same manner as *Ferri et Quininæ Citras*, but with the addition of 1 per cent. of strychnine.

It occurs in thin, transparent, deliquescent, greenish, golden-yellow scales, which are intensely bitter, and mildly ferruginous in taste. Soluble in water (1 in 2). Determined gravimetrically, it should yield 15 per cent. of anhydrous quinine and 1 per cent. of strychnine.

Iron, quinine, and strychnine citrate is used in a similar way to



iron and quinine citrate as a bitter ferruginous tonic. It may be dispensed in mixture form or in pills massed with alcohol. The two preparations are identical in appearance, and care should be taken in storing the strychnine compound.

*Dose*.—1 to 3 decigrams (2 to 5 grains).

## FERRI SULPHAS.

FERROUS SULPHATE.

$\text{FeSO}_4, 7\text{H}_2\text{O} = 278.072.$

*Synonym*.—Iron Sulphate.

Ferrous sulphate,  $\text{FeSO}_4, 7\text{H}_2\text{O}$ , may be prepared by dissolving iron in diluted sulphuric acid and crystallising.

It occurs in the form of large, transparent, pale green crystals. Soluble in water (1 in  $1\frac{1}{2}$ ), but insoluble in alcohol. It should be free from copper, zinc, ferric compounds and other substances yielding a precipitate with hydrogen sulphide, potassium, sodium, ammonium, and oxysulphates. Titrated with standard solution of potassium bichromate, 99.4 per cent. of pure crystallised ferrous sulphate should be indicated. The crystals lose about 40 per cent. of water when heated at  $100^\circ$  until aqueous vapour is no longer given off.

Iron compounds are employed in medicine for their astringent and hæmatinic properties. Taken internally the most important use of iron is in certain anæmias, more particularly chlorosis. In chlorosis, for some reason at present not understood, there appears to be a deficient absorption of iron from the alimentary canal. In health iron is absorbed in small quantities from the duodenum; it passes into the blood and to the liver, where it is built up with proteids to form a complex organic body, which is doled out for the production of hæmoglobin as required. The administration of inorganic iron cures the disease either by providing a more plentiful supply of the missing factor or by removing an excess of sulphuretted hydrogen or other noxious substance from the bowel which prevents the absorption of the organic iron in the food. Very large doses of iron are not necessary for the proper treatment of anæmia, and serve to upset digestion and to produce constipation. In anæmias due to loss of blood, recovery occurs without the exhibition of any drugs, but iron accelerates the cure. Iron has a "tonic" action in all chronic cachectic conditions, such as malaria, syphilis, lardaceous disease, and tubercle, that is, it tends to improve the functions of the body. In any condition in which poverty of blood exists, such as may be present in cardiac or renal disease, iron is also indicated. It is not so valuable in the treatment of pernicious anæmia, but is occasionally of great use when combined with arsenic.

Ferrous sulphate is prescribed in solution—often with magnesium sulphate, quinine sulphate, and diluted sulphuric acid—as a tonic to promote appetite and improve the general condition, also in amenorrhœa and anæmia. Its unpleasant taste is best covered with

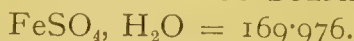
chloroform or peppermint water. In pill form ferrous sulphate is usually combined with aloes to obviate its tendency to constipate, and often with arsenic, extract of nux vomica, or extract of belladonna. Large doses of ferrous sulphate are sometimes given in pill form, the exsiccated salt being used. Large doses given in solution irritate the stomach, and may have an emetic action. All iron preparations are administered on a full stomach. Dilute solutions ( $\frac{1}{2}$  to 1 per cent.) of ferrous sulphate are used for astringent urethral and vaginal injections.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTE.*—Solution of ferrous sulphate is prepared by dissolving 2 of the salt in sufficient distilled water to produce 100, and filtering, the solution being prepared freshly, as required.

### FERRI SULPHAS EXSICCATUS.

EXSICCATED FERROUS SULPHATE.



*Synonyms.*—Exsiccated Iron Sulphate; Dried Sulphate of Iron.

Exsiccated ferrous sulphate,  $\text{FeSO}_4, \text{H}_2\text{O}$ , is prepared by heating crystalline ferrous sulphate to a temperature of  $100^\circ$ , and stirring it at intervals until no more aqueous vapour is evolved, then reducing the residue to a fine powder.

It occurs as a greyish-white powder. Soluble in water, though slowly. It should contain not less than 92.5 per cent. of exsiccated ferrous sulphate, and should be free from the impurities mentioned under Ferri Sulphas.

Exsiccated ferrous sulphate has the properties of crystalline ferrous sulphate, but is specially suitable for the preparation of pills which shall dissolve slowly in the stomach. Such pills are best made with simple syrup, a rather soft mass being quickly prepared and cut into pills rapidly, before hardening takes place. Eight parts of exsiccated ferrous sulphate may be regarded as equivalent to thirteen parts of the crystalline salt.

*Dose.*— $\frac{1}{4}$  to 2 decigrams ( $\frac{1}{2}$  to 3 grains), but as much as 3 decigrams (5 grains) is often given.

*NOTE.*—Commercial exsiccated ferrous sulphate frequently fails to comply with the official standard.

### FERRI SULPHAS GRANULATUS.

GRANULATED FERROUS SULPHATE.



*Synonyms.*—Granulated Iron Sulphate; Granulated Sulphate of Iron.

Granulated iron sulphate,  $\text{FeSO}_4, 7\text{H}_2\text{O}$ , may be prepared by mixing a warm, saturated, slightly acidified solution of ferrous sulphate with alcohol, stirring vigorously, and drying the granular product.

It occurs in small, pale, greenish-blue, granular crystals. They

possess the properties of, and should answer to the reactions for, Ferri Sulphas.

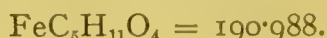
Granulated ferrous sulphate is a convenient form of crystalline ferrous sulphate for use in dispensing, and is less prone to oxidation than the ordinary crystalline salt.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTE.*—Granulated ferrous sulphate was official in the British Pharmacopœia, 1885.

## FERRI VALERIANAS.

IRON VALERIANATE.



*Synonym.*—Ferric Valerianate.

Iron valerianate,  $\text{Fe}(\text{C}_5\text{H}_9\text{O}_2)(\text{OH})_2$ , may be obtained by decomposing in the cold a solution of ferric sulphate or chloride with a solution of sodium valerianate, collecting the precipitate, washing with a little water, and drying at a temperature not exceeding  $20^\circ$ .

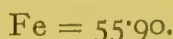
It occurs as a dark red or brown amorphous powder, varying somewhat in composition, having a slight odour and taste of valerianic acid. Insoluble in water, entirely and readily soluble in alcohol; it is decomposed by boiling water, ferric oxide ultimately remaining. It should contain between 15 and 20 per cent. of metallic iron.

Ferric valerianate is a ferruginous and nervine tonic given in hysterical conditions. It is prescribed in pills usually with quinine and zinc valerianates, as in *Pilula Ferri Valerianatis Composita*.

*Dose.*—6 to 30 centigrams (1 to 5 grains).

## FERRUM.

IRON.

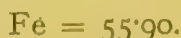


Iron is employed for pharmaceutical purposes in the form of annealed iron wire about 0.1 millimetre (0.005 inch) in diameter (about No. 35 wire gauge), or, unoxidised wrought-iron nails may be used. It contains usually about 99.5 per cent. of metallic iron, with minute quantities of carbon, silicon, sulphur, phosphorus, and arsenic. Specific gravity, 7.6 to 8.14.

*NOTE.*—In a recent examination of two samples of iron, arsenic was found to the extent of 0.01 and 0.05 per cent. respectively; a maximum allowable quantity of 0.03 per cent. has been suggested.

## FERRUM REDACTUM.

REDUCED IRON.



*Synonyms.*—Ferrum Reductum; Quevenne's Iron.

Reduced iron may be prepared by heating ferric hydroxide to dull redness in a porcelain or iron tube, in a current of dry hydrogen,



until water vapour ceases to issue from the end of the tube, which is allowed to cool slowly while hydrogen is still passing through it. Over-heating during manufacture produces a coarse preparation owing to agglomeration of the particles.

It occurs as a fine greyish-black powder consisting mostly of metallic iron, with a variable amount of iron oxide. It is odourless and tasteless, is strongly attracted by the magnet, and under a firm rubbing pressure shows bright metallic streaks. Insoluble in water or alcohol. Water with which it has been shaken should not affect litmus. On treatment with diluted hydrochloric acid the hydrogen evolved should not rapidly or decidedly affect paper moistened with lead acetate solution, indicating absence of more than faint traces of sulphide. The acid solution usually leaves a residue of carbon and silica. On heating to redness in the air it glows and is converted into ferroso-ferric oxide. It should contain less than 1 part of arsenium in 10,000. Copper, a frequent impurity, should be tested for and the limit fixed at 1 in 5,000. Assayed by the copper sulphate, mercuric chloride, or other suitable method, not less than 75 per cent. of metallic iron should be indicated, but reduced iron is obtainable in commerce containing as much as 90 per cent. of metallic iron.

Reduced iron may be given in cachets, lozenges, or in pills; the powder itself may be taken spread on bread and butter. As a chalybeate in dyspepsia it is combined with bismuth and nuxvomica, best in cachet form. Reduced iron is best made into pills by adding powdered liquorice, and massing with syrup of glucose or glycerin of tragacanth. Pills of reduced iron prepared with such vegetable extracts as those of gentian, henbane, and taraxacum, frequently split, owing to evolution of hydrogen by reaction between the metallic iron and acids present in the extracts.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTE.*—This preparation must be carefully distinguished from *Ferrum Pulveratum* of the German Pharmacopœia, which consists of finely ground iron filings and contains about 98 per cent. of metallic iron.

## FERRUM TARTARATUM.

### TARTARATED IRON.

*Synonyms.*—*Ferri et Potassii Tartras*; Iron and Potassium Tartrate.

Tartarated iron is prepared by the following process:—Dilute 100 of solution of ferric sulphate with four times its volume of distilled water, and add solution of ammonia to precipitate ferric hydroxide, as directed in the case of *Ferri et Ammonii Citras*, using about 160 of the solution of ammonia. Mix the well-drained precipitate of ferric hydroxide intimately with 33.25 of acid potassium tartrate, set aside for twenty-four hours, then heat the mixture to a temperature not exceeding 60°, add gradually 600 of distilled water, stir constantly until nothing more will dissolve, and filter the solution. Finally, evaporate the liquid to a thin syrup, at a temperature not exceeding

60°, scale on porcelain tiles or sheets of glass, at a temperature not exceeding 38°, and transfer the dry product to well-closed vessels.

It occurs in thin, transparent, deep garnet-red scales, which are somewhat sweetish and ferruginous in taste. Slowly soluble in water (1 in 1), very sparingly soluble in alcohol. If 10 grammes be incinerated at a red heat, the residue washed with water, and again incinerated with free access of air, a residue of ferric oxide weighing not less than 3 grammes should be obtained.

Tartarated iron is a mild chalybeate, similar in its properties to Ferri et Ammonii Citras.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

## FICUS.

### FIGS.

Figs are the dried succulent receptacles of *Ficus Carica*, Linn. (N.O. Urticaceæ), a tree indigenous to Persia and the surrounding countries, but cultivated in most warm and temperate climates. When the fruits are ripe they are collected and dried in the sun. "Natural" figs are those which are packed loose and retain to some extent their original shape. "Pulled" figs have been kneaded and pulled to make them supple; these are usually packed into small boxes for exportation, and are considered to be the best variety. "Pressed" figs have been closely packed in boxes so that they are compressed into discs. Smyrna figs, which are thin-skinned and soft, are the most esteemed. Greek figs are thicker skinned, tougher, and have less pulp.

As usually met with, figs occur as soft, tough, brown or yellowish discs of irregular shape, and with a very sweet taste. When opened, the figs are seen to bear numerous achenes on the inner surface.

The chief constituent of figs is dextrose, of which they contain about 50 per cent.

Figs are used medicinally for their mild laxative action. They are nutritious and demulcent, and are sometimes recommended in large quantities when a sharp body has been swallowed. Split into two portions, the soft pulpy interior may be applied as a poultice to boils and dental abscesses. Figs are used in the preparation of laxative confections and syrups, usually with senna and carminatives.

## FILIX MAS.

### MALE FERN.

*Synonym*.—*Aspidium*.

Male fern consists of the dried rhizome of *Aspidium Filix-mas*, Swartz (N.O. Filicineæ), a fern indigenous to Great Britain. The rhizome is collected late in the autumn, divested of its roots, leaves, and dead portions, and sometimes sliced longitudinally to facilitate drying.

The rhizome occurs in pieces from 7.5 to 15 centimetres in length,

and from 2 to 2·5 centimetres in diameter. It is covered with the hard, persistent, curved, angular, dark brown bases of the petioles, which bear numerous brownish membranous hairs. Externally the rhizome is brown, internally green, becoming, however, brown on long keeping. Transverse sections of both rhizome and petiole should exhibit about eight steles arranged in a diffuse circle. The membranous hairs consist of elongated cells, and bear on the margin simple, hair-like processes, each of which consists of two parallel and contiguous cells. The odour is disagreeable, the taste nauseous and bitter. In the parenchymatous tissue of both rhizome and petiole there exist axially elongated intercellular cavities into which glandular hairs project, covered with a resinous secretion in which the active constituents are contained.

The chief constituent of male fern is a yellow amorphous substance of an acid nature, termed filmarone, to which the vermifuge properties of male fern are attributed. In solution it slowly decomposes into filicic acid and aspidinol, both of which also occur preformed in the drug. Filicic acid is crystalline and melts at  $213^{\circ}$  to  $215^{\circ}$ ; aspidinol crystallises in white needles, melting at  $143^{\circ}$ , and is sparingly soluble in benzol and petroleum spirit. Other constituents of the drug are flavaspidic acid, which crystallises in long yellow prisms (melting-point,  $154^{\circ}$  to  $155^{\circ}$ ), albaspidin (melting-point,  $148^{\circ}$ ), and aspidinol; filicitannic acid is also present.

Male fern has an astringent action, and is occasionally used in the form of powder. Liquid extract of male fern is used to expel tapeworm, to all varieties of which it is a direct poison (see *Extractum Filicis Liquidum*); in very large doses it is a violent irritant, giving rise to acute gastro-enteritis. Filicic acid is given in doses of 3 to 10 decigrams (5 to 15 grains), and has been recommended in place of liquid extract of male fern, but its action is less certain; filicin, the anhydride of filicic acid, is inactive.

*Dose*.—4 to 12 grammes (60 to 180 grains).

*NOTES*.—The only likely substitutes for, or adulterants of, male fern rhizome are the rhizomes of *Aspidium spinulosum* and *Athyrium Filix-femina*. The former very closely resembles male fern, but may be distinguished by the membranous scales, which bear on their margins glandular hairs; like male fern it is an active anthelmintic, this property depending partly at least upon the crystallisable body, aspidin, which it contains. The rhizome of *A. Filix-femina* exhibits two large dumb-bell shaped steles in place of the seven or more present in male fern.

## FŒNICULI FRUCTUS.

### FENNEL FRUIT.

*Synonyms*.—Fœniculum; Fennel.

Fennel fruit is the product of *Fœniculum capillaceum*, Gilib. (N.O. Umbelliferæ), a plant indigenous to the countries bordering the Mediterranean, but cultivated for medicinal use in the South of France, Saxony, Russia, etc. The dried ripe fruit collected from cultivated plants is alone official.

The fruits are from 4 to 6 millimetres (Galician and Russian) or 8 to 10 millimetres (Saxon) in length, and about 3 millimetres in diameter,



greenish or yellowish-brown in colour, oblong in shape and capped by a stylopod. They are glabrous, and each is composed of two mericarps united and attached to a pedicel. Each mericarp has five prominent primary ridges, and in transverse section exhibits six large oil glands (vittæ) about 0·2 millimetre wide. The odour is aromatic; the taste aromatic, sweet, and agreeable. The powder may be identified by the presence of large parenchymatous cells with spiral or reticulate thickening and by the characteristic inner epidermis of the pericarp, which consists of groups of about six narrow elongated cells arranged with their long axes parallel to one another, but oblique to the long axes of other similar groups of cells; there are no hairs; the cells of the endosperm have rather thick walls and contain small cluster-crystals of calcium oxalate.

The chief constituent of fennel fruit is from 4 to 5 per cent. of a volatile oil which contains about 18 to 20 per cent. of fenchone. The drug may yield about 8 per cent. of ash.

Fennel fruit is aromatic and carminative; it is used in the form of powder with purgatives, as in *Pulvis Glycyrrhizæ Compositus*, to allay their tendency to griping. Fennel water has properties similar to those of anise and dill water; mixed with sodium bicarbonate and syrup, these waters constitute the domestic "gripe water," used to correct the flatulence of infants. Volatile oil of fennel has these properties in concentration, and may be added to pills or given on sugar.

NOTES.—The French sweet fennel yields only about 2 per cent. of oil, which is practically free from fenchone. The chief commercial varieties are Saxon, Galician, and Russian. All these varieties yield from 4 to 5 per cent. of volatile oil, which consists chiefly of pinene, dipentene, and fenchone, together with anethol (50 per cent. in good oils) and phellandrene; it should yield by distillation not less than 15 per cent. of fenchone (boiling-point, 192° to 193°). The fruits possess a strong penetrating camphoraceous odour, and in transverse section exhibit six large vittæ, about 2 millimetres wide. These varieties may be regarded as suitable for pharmaceutical use. French fennel resembles the Saxon in appearance, but has a decidedly sweet anise odour, due to a comparatively large proportion of anethol. Japanese fennel is small (3 to 4 millimetres in length) and has an odour intermediate between that of the French and Saxon. These varieties are less suited for pharmaceutical use. Exhausted or partially exhausted fennel is deficient in oil, and therefore deficient in odour; it may often be distinguished by its darker colour.

## FÆNUM-GRÆCI SEMINA.

### FÆNUGREEK SEEDS.

Fœnugreek seeds are the product of *Trigonella Fœnum-græcum*, Linn. (N.O. Leguminosæ), an annual herb, largely cultivated in India, Egypt, and Morocco. They are contained in long, narrow, curved pods, from which they are separated by thrashing, when ripe, and dried.

The seeds are usually brownish-yellow in colour and rhomboidal in outline. They are from 3 to 5 millimetres long and about 2 milli-

metres thick, and exhibit on one of the narrow sides a depression in which both hilum and micropyle are situated, and from which a deep furrow runs almost dividing the seed into two unequal lobes. A section parallel to one of the long narrow sides of the seeds exhibits a horny, translucent endosperm surrounding a small radicle and two larger accumbent cotyledons; in water the endosperm swells considerably, and yields the mucilage it contains to that solvent. Fœnugreek seeds have a characteristic odour and disagreeable taste. Powdered, they are used in veterinary medicine, and occasionally in curry powders, etc. The green parts of the plant are largely used in the countries where it is cultivated, both as a fodder and for culinary purposes.

Fœnugreek seeds contain 28 per cent. of mucilage (in the endosperm), 6 per cent. of fixed oil, and 22 per cent. of proteids; they also contain the alkaloids trigonelline and choline.

### FORMAMINA.

#### FORMAMINE.



*Synonyms.*—Hexamethyleneamine; Hexamethylenetetramine.

Formamine or hexamethyleneamine,  $(\text{CH}_2)_6\text{N}_4$ , is prepared by the action of ammonia on formaldehyde.

It occurs in the form of a white crystalline powder and is odourless. It is very soluble in water (about 1 in  $1\frac{1}{2}$ ), in alcohol (1 in 8), almost insoluble in ether. Its aqueous solution has an alkaline reaction. On heating it sublimes without melting and with partial decomposition. In contact with acids it is decomposed into formaldehyde and ammonia. If 1 decigram be heated gently with an equal weight of salicylic acid and 5 mils of sulphuric acid, a carmine-red colour will be produced. In an aqueous solution tannic acid gives a precipitate, and so does mercuric chloride solution, the precipitate in the latter case forming crystalline needles on standing. A solution of morphine is said to give with formamine and hydrochloric acid a blue colour turning to purple, and solution of codeine a blue turning to a distinct green colouration.

Formamine is a powerful disinfectant of the urinary system. It sterilises the urine in cystitis and in typhoid fever, and is used in all bacterial infections of the bladder and urethra. It has a powerful action *in vitro*, as a solvent of uric acid, and has been used in gout and rheumatism to promote elimination of this substance, but without much success. Large doses may cause albuminuria and hæmaturia, but this is said to be avoided by well diluting the dose. It may be given in solution in mixture form flavoured with syrup of orange, or in cachets, to be swallowed with a tumblerful of water. Capsules of formamine with sandal wood oil are given in gonorrhœa, sometimes with the addition of methylene blue.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

NOTES.—Formamine is also known under the following trade-names:—Amine form, Ammonio-Formaldehyde, Ammonaldehyde, Cystamin, Cystogen, Formin, Metramine, Urisol, Uritone, Urotropine, and Vesalvine. Formamine dioxymethylene (Hetraline) has been introduced as a substitute for formamine, which it resembles in its general properties. *Dose*, 5 to 20 decigrams (8 to 30 grains).

## FORMAMOL.

### FORMAMOL.

*Synonyms*.—Formamine-methylene Citrate; Hexamethylenetetramine-anhydromethylene Citrate.

Formamol is prepared by combining anhydromethylene-citric acid with formamine.

It occurs in the form of colourless crystals, or as a white crystalline powder having an acid taste. Soluble in water (1 in 5); sparingly soluble in alcohol; insoluble in ether. It is slowly decomposed by diluted acids, more readily by alkalies, with liberation of formaldehyde. On heating to about 160° it is decomposed. Two grammes of the substance represent 0.85 gramme of formamine.

Formamol is given for similar purposes to formamine, and is believed to act in a similar way. It may be given in cachets.

*Dose*.— $\frac{1}{2}$  to 1 gramme ( $7\frac{1}{2}$  to 15 grains).

NOTE.—Formamol is also known under the trade-names Citramin, Citraminoxiphen, Helmitol, Uropurgol, Neurotropine, and New Urotropine.

## FRANGULÆ CORTEX.

### FRANGULA BARK.

*Synonyms*.—Frangula; Alder Buckthorn Bark.

Frangula bark is obtained from the stem and branches of *Rhamnus Frangula*, Linn. (N.O. Rhamnæ), a shrub widely distributed over Europe. The dried bark should mature for at least a year before being employed medicinally.

The bark varies considerably in appearance, according to the age of the branch or stem from which it has been taken. Young bark, which is to be preferred, occurs in narrow (about 1 centimetre), single or double quills and is of papery texture. It is covered with smooth cork of a dark purplish colour, and bears numerous whitish lenticels; when gently scraped the inner layers are seen to be crimson in colour. The inner surface of the bark is brown and very finely striated. The fracture is short in the cork and cortex but fibrous in the bast. Older bark is rougher externally, thicker, and usually in single quills or channelled pieces. Transverse sections are characterised by the absence of sclerenchymatous cells from the cortex and bast. The taste of the drug is sweetish and slightly bitter.

The constituents of frangula bark, especially those to which the laxative properties are due, are but imperfectly known. A crystalline



glucoside, frangulin, yielding by hydrolysis rhamnose and frangula-emodin, has been isolated from it; this body is said to be isomeric with barbaloin. The emetic action of the fresh bark has been attributed to an enzyme, and it has been asserted that the maturing of the bark can be rendered unnecessary by heating it for a short time to 100°, thus rendering the enzyme inactive. Possibly other glucosides, yielding oxymethylanthraquinones by hydrolysis, are also present and contribute to the laxative action of the drug, but the evidence in favour of this assumption is not conclusive. Compare also the constituents of *cascara sagrada*.

Frangula bark has properties similar to those of *cascara sagrada*. It is used as a mild purgative principally in the form of liquid extract.

NOTE.—Frangula or alder buckthorn should be distinguished from common buckthorn (*Rhamnus catharticus*, Linn.), from the ripe berries of which Syrupus Rhamni is prepared.

## FUCUS.

### BLADDER-WRACK.

Bladder-wrack, *Fucus vesiculosus*, Linn. (Order Fucaceæ), is one of the commonest seaweeds on the coast of Great Britain. For medicinal use the plant should be freshly gathered from the rocks, on which it grows, and dried.

The drug consists of the dried, nearly black, thin, flattened branching thallus, about 18 millimetres wide, and sometimes as much as a metre in length. When quite dry it is hard and brittle, but becomes softer and cartilaginous when moist. It has an entire margin, and bears air vesicles in pairs. Some of the branches terminate in thickened enlargements, in which the reproductive organs are situated. The drug has a seaweed-like odour and a disagreeable, mawkish taste.

The chief constituent of bladder-wrack is a gelatinous substance, algin, but the drug also contains mannite and fat. It yields about 1.6 to 3 per cent. of ash, and contains about 0.01 per cent. of iodine, which is said to exist in the seaweed in the form of an organic compound.

Bladder-wrack has been used to reduce glandular swellings, but is now employed principally as an "anti-fat," forming the basis of most advertised nostrums of this nature. Nothing definite is known regarding its pharmacology. For the preparation of pills the solid Extractum Fuci Vesiculosi is suitable. The liquid extract is used in mixture form, generally with alkali iodides, and sometimes in combination with Liquor Thyroidei, another remedy which increases metabolism and hence diminishes weight.

NOTES.—*Fucus serratus*, Linn., is also commonly found on the sea-shore, but may be distinguished from *F. vesiculosus* by its serrated margin and absence of air vesicles. *Fucus nodosus*, Linn., which is also common, has single vesicles.

**GALANGÆ RHIZOMA.**

## GALANGAL.

*Synonyms.*—Galangal Root; Lesser Galangal.

Galangal is the dried rhizome of *Alpinia officinarum*, Hance (N.O. Scitamineæ), a flag-like plant cultivated in South-East China and on the neighbouring island of Hainan.

It occurs in hard, branching, nearly cylindrical pieces, varying from 5 to 8 centimetres in length and from 10 to 15 millimetres in thickness, which are well characterised by their dull reddish-brown colour and by the paler frilled remains of cataphyllary leaves which encircle them at short intervals. The smoothed transverse section is generally paler than the exterior of the drug and exhibits a comparatively small stele surrounded by a wide cortex; in both cortex and stele numerous scattered deep red resin cells occur. It has an agreeable aroma and strongly pungent spicy taste.

The aroma of galangal is due to a small quantity of volatile oil, the pungency to an oily body, galangol. The drug also contains three tasteless yellow crystalline bodies, viz., kæmpferid, galangin, and the monomethyl-ether of galangin. Alpinin, which is sometimes stated to be a constituent of the drug, is said to be a mixture of kæmpferid and galangin.

Galangal is aromatic and carminative. It is used in the form of infusion or decoction (1 in 20) for flatulence and dyspepsia.

NOTE.—The rhizome of *Alpinia officinarum* should be carefully distinguished from that of the greater galangal, *Alpinia Galanga*, Willd., which is occasionally imported from Java, and may be distinguished by its larger size, orange-brown cork, and pale buff interior.

**GALBANUM.**

## GALBANUM.

Galbanum is a gum resin obtained from *Ferula galbaniflua*, Boissier and Buhse (N.O. Umbelliferæ) and other species of *Ferula*. The drug is collected in Persia, and reaches the European market chiefly *via* Bombay. The method by which it is collected is not accurately known, but probably part exudes from the stem, whilst part is certainly obtained by cutting the stem off at the base, and collecting the gum resin after it has been allowed to exude and harden, after which a slice of the root is removed and the operation repeated.

The official drug is the variety known as Levant galbanum, and is the kind generally met with in commerce. It occurs in separate tears, or small masses of agglutinated tears. The tears are usually small, 5 to 10 millimetres in diameter, and of a yellowish or orange-brown colour; the surface is often rough and dirty, and, though hard in cold weather, the tears soften between the fingers. Internally they are usually pale yellowish in colour and opaque, though sometimes translucent and bluish-green. The drug has an unpleasant

bitter taste, and characteristic somewhat aromatic odour. It is distinguished from ammoniacum by being more readily softened as well as by its distinctive odour and by the presence in it of umbelliferone. The latter may be detected by heating a fragment to redness in a test tube, boiling the contents of the latter with water, filtering and adding ammonia, which imparts a fine blue fluorescence to the liquid if umbelliferone is present. Another method of testing for umbelliferone consists in boiling the drug with strong hydrochloric acid for a few minutes and filtering into water made alkaline with ammonia. Good galbanum yields about 10 per cent. of moisture, about 40 per cent. of substances insoluble in alcohol, and leaves about 7 per cent. of ash. Hydrochloric acid (specific gravity, 1.12) warmed with galbanum acquires a fine red colouration.

The gum resin contains from 5 to 10 per cent. of volatile oil, about 60 per cent. of resin, and 20 per cent. of gum, together with moisture, mineral constituents, and impurities. Among the latter, circular slices of the root are regularly found in the galbanum of commerce. The volatile oil appears to vary in its characters according to the age, etc., of the drug from which it is obtained, that from Levant galbanum being lævorotatory; it contains *d*-pinene and cadinene. The resin consists of umbelliferone combined with galbaresinotannol, the drug yielding as much as 20 per cent. of umbelliferone; traces of this substance are also present uncombined.

Galbanum is employed as a stimulant expectorant in chronic bronchitis. It is used externally in the form of plaster (see *Emplastrum Galbani*) for inflammatory swellings. On account of its disagreeable taste and odour galbanum is given internally in pill form, generally with *asafetida* as *Pilula Galbani Composita*, a combination which is especially useful in some hysterical conditions, and as an expectorant in chronic bronchitis, when accompanied by profuse expectoration.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

*NOTES*.—Galbanum is often imported in lumps consisting of yellowish or bluish-green tears embedded in a brownish resinous mass; this variety is excluded by the official description, but it has been asserted that it is preferable to the tear, inasmuch as it contains more volatile oil. The variety of galbanum known as Persian is now seldom seen on the market; it is softer than Levant, has a more terebinthinate odour, and contains fruits and fragments of stalks instead of slices of the root.

## GALLA.

### GALLS.

*Synonym*.—Nutmall.

Galls are excrescences on the twigs of the dyer's oak, *Quercus infectoria*, Olivier (N.O. Cupuliferæ), a small tree indigenous to Asia Minor and Persia. They are formed as the result of irritation induced by the deposition of eggs by the gall-wasp, *Cynips Galla tinctoria*, Olivier (Order Hymenoptera). The nature of galls varies considerably, according to the exciting cause and the plant or part of the plant



affected, but the official galls may be regarded as metamorphosed shoots, the metamorphosis being induced by the gall-wasp. This insect, of which the female only is known, introduces its egg between the rudimentary leaves near the growing point of a shoot by means of its ovipositor. The young larva feeds upon the tissues of the plant, and secretes in its mouth a fluid which stimulates the cells of the tissues to a rapid division, resulting in the formation of a gall. Within this gall the larva passes through the pupa stage, and the wasp, as soon as it emerges, escapes by piercing a hole with its mandibles. The galls, collected before the perforation has been effected, are of a dark olive-green colour (blue galls), whilst those collected after perforation have a more or less pronounced yellowish or brown colour (white galls), the latter being the less esteemed. The galls are collected in Asia Minor and Persia and exported largely from Aleppo and the Persian Gulf.

They are nearly spherical in shape, about 12 to 18 millimetres in diameter, and of a dark bluish-green or olive-green colour. Near the base they are smooth, but the upper portion is tuberculated. They are hard and heavy, internally yellowish or pale brown, with a small central cavity which, in unperforated galls, contains the remains of the insect; they are odourless, but have an intensely astringent taste. Below the epidermis is a parenchymatous tissue differentiated into three layers. The cells of the outer layer have thick walls and contain fragments of tannin; those of the middle layer have thinner walls and exhibit intercellular spaces, these cells also contain tannin. The cells of the inner layer have thin walls, are axially elongated, and firmly adherent to one another; they contain tannin and cluster-crystals of calcium oxalate. This tissue passes into a ring of irregularly pitted, sclerenchymatous cells containing small rounded starch grains with stellate hilum. The powder is well characterised by the abundance of tannin, the sclerenchymatous cells and characteristic starch grains.

The principal constituent of galls is gallotannic acid, of which blue galls contain 60 to 80 per cent. Small quantities of gallic acid (2 per cent.), ellagic acid, gum, starch, inorganic matter (about 2 per cent.), moisture (10 per cent.), and a monobasic oxycarbonic acid termed cyclogallipharic acid, and eutannin, are also present.

Galls are powerfully astringent, owing to the large proportion of gallotannic acid they contain. *Tinctura Gallæ* is sometimes used internally as an astringent, but preparations of galls are usually applied externally. As a lotion or injection to lessen mucous discharges of the vagina or urethra, also to arrest hæmorrhage from the nose or gums, *Decoctum Gallæ* is suitable. *Unguentum Gallæ* and *Unguentum Gallæ cum Opio* are valuable astringents for use in painful hæmorrhoids. For similar use, suppositories are prepared containing 3 decigrams (5 grains) of powdered galls with or without 6 centigrams (1 grain) of powdered opium, or 3 centigrams ( $\frac{1}{2}$  grain) of cocaine. It should be remembered that the opium has no peripheral action; its whole benefit results from its action on the central

nervous system after absorption. Preparations of galls should not be prescribed with the salts of iron, lead, copper, or silver.

*Dose*.—6 to 12 decigrams (10 to 20 grains).

*NOTES*.—White galls are those collected after the escape of the wasp, they are slightly larger than the blue galls, lighter in weight, and are less esteemed, although analysis of them does not indicate an appreciably smaller quantity of gallo-tannic acid. English galls or oak galls are smooth, globular, brown in colour, and usually perforated; they are much less active than the Aleppo, containing only 15 to 20 per cent. of gallo-tannic acid. Chinese galls, produced by a species of *Aphis* on *Rhus semialata*, Murray (N.O. Anacardiaceæ), are used commercially chiefly for the manufacture of tannic acid, ink, etc. They are irregular in form, with a covering of thick, grey, velvety down, which masks their reddish-brown colour. They contain about 70 per cent. of gallo-tannic acid.

### GARGARISMA ACIDI CARBOLICI.

#### CARBOLIC ACID GARGLE.

*Synonym*.—Phenol Gargle.

Glycerin of Carbolic Acid	...	...	...	5.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dilute the glycerin of phenol with the water.

This gargle is useful in the sore throat accompanying influenza colds; in "dust" sore throats, and other forms. It is also used against infection. It should be remembered that the tonsils are not touched by the liquid in gargling; at least, in the case of the average patient. To apply the drug by painting is the most efficient way to reach the tonsils.

### GARGARISMA ACIDI CHROMICI.

#### CHROMIC ACID GARGLE.

Chromic Acid	...	...	...	...	0.20
Distilled Water, sufficient to produce	...	...	...	...	100.00

Dissolve the chromic acid in the distilled water.

This gargle is a powerful deodorant and disinfectant. It is used in syphilitic throat affections.

### GARGARISMA ACIDI TANNICI.

#### TANNIC ACID GARGLE.

Glycerin of Tannic Acid	...	...	...	10.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dilute the glycerin of tannic acid with the water.

This gargle is used for relaxed and inflamed throats; it diminishes the secretion of mucus.

### GARGARISMA ALUMINIS.

#### ALUM GARGLE.

Alum	...	...	...	...	2.00
Acid Infusion of Roses, sufficient to produce	...	...	...	...	100.00

Dissolve the alum in the acid infusion of roses.

This gargle is used in "sore" throat with elongated uvula.

**GARGARISMA BORACIS.**

## BORAX GARGLE.

Borax	...	...	...	...	...	4'00
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Dissolve the borax in the distilled water.

This gargle is used for aphthous conditions of the throat and mouth.

**GARGARISMA CHLORI.**

## CHLORINE GARGLE.

Potassium Chlorate	...	...	...	...	2'25
Hydrochloric Acid	...	...	...	...	0'50
Distilled Water, sufficient to make	...	...	...	...	100'00

Place the potassium chlorate in a dry bottle, pour the acid upon it, and set aside, loosely corked, for ten minutes. Then add the water in four or five successive portions, shaking between each addition, so that the gas may be absorbed as completely as possible.

This gargle is used in diphtheria, scarlatina, and septic throat. It is usually employed diluted with one or more parts of water. It should be recently prepared, as it deteriorates slowly on standing, and quickly if exposed to light.

**GARGARISMA MYRRHÆ.**

## MYRRH GARGLE.

Tincture of Myrrh	...	...	...	...	5'00
Honey	...	...	...	...	5'00
Acid Infusion of Roses, sufficient to produce	...	...	...	...	100'00

Mix the tincture of myrrh with the honey, and gradually add the acid infusion of roses.

This gargle is used as an astringent in aphthous stomatitis and ulcerated throat.

**GARGARISMA POTASSII CHLORATIS.**

## POTASSIUM CHLORATE GARGLE.

Potassium Chlorate	...	...	...	...	2'00
Diluted Hydrochloric Acid	...	...	...	...	1'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the potassium chlorate in the water, and add the diluted hydrochloric acid to the solution. The product contains only a minute proportion of free chlorine. Compare Gargarisma Chlorig.

This gargle is used for ulcerated and inflamed throat; also in tonsillitis and pharyngitis.

**GARGARISMA POTASSII PERMANGANATIS.**

## POTASSIUM PERMANGANATE GARGLE.

Solution of Potassium Permanganate	...	...	...	...	2'50
Distilled Water, sufficient to produce	...	...	...	...	100'00



Dilute the solution of potassium permanganate with the distilled water.

This gargle is used as an antiseptic and deodorant, its properties being intensified, if desired, by the addition of 0.4 per cent. of diluted sulphuric acid.

## GELATINUM.

### GELATIN.

*Synonym.*—Glutin.

Gelatin is an albuminoid which is obtained by boiling bone cartilage, connective tissue, skins, and other animal tissues (the so-called "collogenes") with water, skimming and straining the resulting liquid, evaporating the solution at a low temperature, and finally drying by exposure to the air. Gelatin does not pre-exist as such in the animal tissues, but is formed by the prolonged action of boiling water on collagen, which is probably an anhydride of gelatin, and is the substance of which the white fibres of connective tissue are composed. The crude glutin or bone-glue is highly coloured and odorous, but the colour and odour are removed by purification, and commercial gelatin is thus obtained.

It occurs as an amorphous, more or less transparent solid, usually in thin sheets bearing the marks of the netting on which it has been dried, but also in shreds or coarse powder, colourless or with only a slight yellow tint, and almost odourless and tasteless. It is permanent in air when dry, but putrefies rapidly when moist or in solution. Insoluble in cold water, alcohol, ether, chloroform, benzene, carbon bisulphide, fixed oils, or volatile oils; soluble in hot water, acetic acid, and glycerin. Though insoluble in cold water, it swells in that liquid, absorbing five or six times its weight of the water. The softened gelatin dissolves when heated, forming a viscid liquid which sets to a jelly on cooling. This property, however, which varies considerably with different samples of gelatin, is much lessened by prolonged heating of the solution, and is quickly destroyed by heating to 140° in sealed tubes, the gelatin being altered to gelatose, paragelatose, or gelatones. Certain bacteria also have the power of liquefying the jelly. The solubility of gelatin in acetic acid distinguishes it from chondrin, a mixture of glutin with mucinoid substances, obtained from hyaline cartilage by boiling with water, and precipitated from the aqueous solution by acetic acid. An aqueous solution of gelatin gives no precipitate with acids, except tannic acid (distinction from proteids), is not affected by alum, lead acetate, ferric chloride, or the majority of metallic salts which precipitate the proteids, but is precipitated by chlorine or bromine water, mercuric chloride, platinic chloride, picric acid, etc., and is completely precipitated by saturation with ammonium sulphate, magnesium sulphate, or zinc sulphate. When potassium bichromate is added to the hot aqueous solution the jelly which forms on cooling becomes insoluble in warm water after

exposure to light, while formaldehyde renders the gelatin hard and insoluble after drying. On incineration gelatin leaves a little mineral residue, but this should not exceed 2 per cent. A 2 per cent. solution in hot water should be odourless and gelatinise on cooling.

Glutin, of which gelatin chiefly consists, contains carbon, 50 per cent., hydrogen, 6·5 per cent., nitrogen, 18 per cent., oxygen, 25 per cent., and sulphur, 0·5 per cent. Its aqueous solution is neutral, indiffusible or colloidal, and strongly lævo-rotatory. It gives most of the proteid colour tests, and, like proteids, is converted on digestion into peptone-like substances. Chondrin, like gelatin, is precipitated from its solution by tannic acid, but it also gives the reactions of mucin, being precipitated by acetic acid, lead acetate, and other reagents which do not affect gelatin. On boiling glutin with solutions of the fixed alkali hydroxides, or with diluted sulphuric acid, it is decomposed into ammonia, glycocoll, leucine, and other amido-fatty acids. When heated with hydrochloric acid on a water-bath, it yields a glutin-peptone chlorhydrate, which is soluble in absolute alcohol, and from which glutin peptones can be obtained.

Gelatin is largely used as a nutrient; its nitrogen value is high, but its carbon value relatively low. It therefore possesses a low heat value, and its value as a foodstuff has been exaggerated. Injected hypodermically—1 or 2 per cent. in normal saline solution, sterilised—it has been used to promote the formation of clot in aneurisms, and to arrest hæmorrhage from the lungs or kidneys. Stronger solutions (5 per cent.) have been used by rectal injection for purpura and hæmoptysis. Gelatin has also been applied locally to bleeding surfaces. The use of gelatin as a styptic was based on the misconception that it favoured coagulation; but there is no certain evidence that it is useful in any of these conditions. Solutions of gelatin for rectal, subcutaneous, or local use must be sterilised with the most rigorous care, as tetanus has in some instances arisen from their use, and some specimens of gelatin examined have been stated to show the presence of tetanus bacilli. A temperature exceeding 100° should not, however, be applied. Gelatin is largely used as a demulcent and emollient in the preparation of pastilles for the local application of medicaments to the throat (see Glyco-Gelatinum). A similar basis containing a smaller proportion of gelatin is used in the preparation of pessaries and urethral bougies and to solidify glycerin for use as a suppository (see Gelato-Glycerinum and Suppositorium Glycerini). The gelato-glycerin base is also used for the preparation of nasal bougies. Tannin, owing to the facility with which it combines with gelatin, is better prescribed with cacao butter in bougies, suppositories, and pessaries. Pastes of gelatin with glycerin, of the type of Pasta Ichthamolis, are prepared containing zinc oxide, resorcin, or other medicaments for application to the skin in eczematous conditions. Gelatin is a valuable agent in the preparation of culture media for use in bacteriology. In pharmacy, gelatin capsules afford a convenient means of administering many disagreeable substances in a

convenient and readily soluble form. When solution is required to take place only in the intestine, the capsules may be coated with keratin or dipped in solution of formaldehyde (see Capsulæ), being known as glutoid capsules in the latter case. Formaldehyde-gelatin, or glutol, is insoluble in water, and is used in sheets or in powder as an antiseptic dressing.

NOTES.—The gelatinising power of different samples varies considerably, so that it is found convenient to use the same brand of gelatin in the preparation of special formulæ. A very pure gelatin may be prepared by soaking the best grade of the commercial substance for several days in successive quantities of water. By this treatment saline and soluble bodies are removed. The gelatin is then dissolved in hot distilled water and filtered while hot into alcohol. The white thready masses thus precipitated are redissolved in hot water, the precipitation in alcohol repeated, and the product subsequently dried. Thus prepared, the gelatin contains only 0.6 per cent. of ash.

### GELATINUM CODEINÆ.

#### CODEINE JELLY.

Codeine	...	...	...	...	...	0.20
Citric Acid	...	...	...	...	...	2.00
Gelatin	...	...	...	...	...	8.00
Glycerin	...	...	...	...	...	48.50
Terpeneless Oil of Lemon	...	...	...	...	...	0.01
Balsam of Tolu	...	...	...	...	...	3.20
Distilled Water, a sufficient quantity.						

Boil the tolu in 51 of the water as directed in the case of Syrupus Tolutanus, making the final volume 41. Soak the gelatin in 34 of the liquor so prepared, and heat until dissolved, then add the glycerin. Dissolve the codeine and citric acid in the remaining 7 of liquor, mix with the solution of gelatin, add the oil of lemon, and stir well together.

Codeine jelly is used in chronic laryngitis and in the hacking cough of phthisis.

*Dose.*—4 grammes (60 grains).

### GELATO-GLYCERINUM.

#### GELATO-GLYCERIN.

Gelatin	...	...	...	...	...	33.50
Glycerin	...	...	...	...	...	40.00
Distilled Water	...	...	...	...	...	40.00

Soak the gelatin in the water for twelve hours, with occasional stirring; then add the glycerin, dissolve on a water-bath, and evaporate so as to produce 100 by weight of the gelato-glycerin.

This preparation is used for nasal bougies. If required for pessaries, the official glycerin suppository mass may be used, or 18 of gelatin may be mixed with 64 of glycerin and 18 of water.

NOTES.—Gelatinum Glycerinatum, U.S.P., is prepared by soaking 50 of gelatin for one hour in water which has been boiled and cooled, then pouring off the water, adding 50 by weight of glycerin, and heating on a water-bath until the gelatin is dissolved and the solution weighs 100.



**GELSEMII RADIX.****GELSEMIUM ROOT.**

*Synonyms.*—Gelsemium; Yellow Jasmine Root.

Gelsemium consists of the dried rhizome and root of *Gelsemium nitidum*, Michaux, also known as *G. sempervirens*, Ait, (N.O. Loganiaceæ), a climbing plant indigenous to the Atlantic and Gulf regions of the United States.

The rhizome usually occurs in straight, nearly cylindrical pieces 10 to 20 centimetres in length and 5 to 20 millimetres in thickness. In young pieces the outer layer is a brownish-violet cork, which becomes much furrowed during the subsequent growth of the rhizome until it becomes in the older pieces yellowish-brown marked with purple reticulated lines. The fracture is woody and splintery; a smoothed section exhibits a very conspicuous radiate structure, narrow, yellowish, wood bundles with small vessels alternating with straight, whitish, medullary rays. In the cortex occasional silky bast fibres may be found, whilst the centre of the rhizome is usually occupied by a small pith. The root differs from the rhizome, which it otherwise closely resembles, in being of a uniform yellowish colour and somewhat tortuous; it is destitute of a pith and of bast fibres. Gelsemium has a bitter taste and a slight agreeable odour.

The drug contains a crystalline alkaloid, gelsemine, an amorphous alkaloid, gelseminine (0·2 to 0·7 per cent.),  $\beta$ -methyl-æsculetin, starch, fixed oil, resin, etc. Gelseminine is powerfully toxic, but gelsemine is much less potent, if not devoid of action, and any effects which have been ascribed to gelsemine may be attributed to the presence of the amorphous and toxic body gelseminine as an impurity.  $\beta$ -methyl-æsculetin (scopoletin, Eykman; chrysotropic acid, Kunz) is also found in belladonna root, scopola rhizome, and horse-chestnut bark.

Gelsemium acts somewhat like conium, except that it paralyses the nerve centres first, and the motor nerve endings only after very large doses. It is used in migraine and neuralgia, especially neuralgia of the fifth nerve; also in rheumatic, ovarian, and uterine pain. The action of the drug is due to gelseminine. It should be used with care, as untoward symptoms sometimes result from comparatively small doses. Excessive doses cause giddiness, double vision, and loss of power, with slowing and subsequent stoppage of respiration. The tincture is most commonly used, and may be given in mixture form with the bromides or with butyl-chloral hydrate. Alcoholic extract of gelsemium is prescribed in pills, frequently with butyl-chloral. Applied to the eye gelsemium produces dilatation of the pupil, lasting about two days, and some irritation. Its use as a mydriatic has been abandoned. A powdered alcoholic extract, named gelsemin, is given in pills, in doses of 3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains); it must be carefully distinguished from the alkaloids gelsemine and gelseminine.

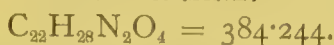
*Dose of the powdered root.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTES.*—Portions of the slender aerial stems which are often attached to the rhizome may be recognised by their purple colour and abundant silky bast

fibres; large pieces should not be present in the drug, as they are less active. The rhizome of *Jasminum fruticans*, Linn., is said to be collected in the place of gelsemium; it may be distinguished by the cells of the pith, which are thin-walled and full of starch, while those of gelsemium are thick-walled and empty.

## GELSEMINA.

### GELSEMINE.



Gelsemine,  $C_{22}H_{28}N_2O_4$ , is an alkaloid obtained from the root of *Gelsemium nitidum*, Michaux (N.O. Loganiaceæ).

It occurs as an amorphous, transparent bitter mass, crystallising with difficulty from alcohol, when it occurs in minute white or yellowish-white crystals. Soluble with difficulty in water, more easily in alcohol, very easily soluble in ether or chloroform. Melting-point,  $45^\circ$ . It has a strongly alkaline reaction. With concentrated sulphuric acid it gives a yellowish, and with concentrated nitric acid a green colouration. Sulphuric acid with an oxidising agent gives a violet colouration, which becomes green after a while.

Gelsemine must be distinguished from gelsemin, the resinoid prepared by extracting gelsemium root with alcohol and occurring as a powdered extract. It must also be carefully distinguished from gelseminine, an intensely poisonous amorphous alkaloid obtained from gelsemium root. Because of its great toxicity gelseminine is rarely, if ever, used in medicine; it has much the same action as coniine, but is more depressant to the central nervous system. It paralyzes sympathetic nerve-cells, and dilates the pupil in the same way as atropine.

Gelsemine is much less toxic than gelseminine, and any effects which it produces are probably due to the presence of traces of gelseminine as an impurity. It has proved of some value in neuralgias, especially trigeminal. In large doses gelsemine produces convulsions in frogs, in the same way as strychnine, and afterwards it paralyzes the motor nerve-endings, but it is almost devoid of action in mammals. It is sometimes prescribed in pills or cachets, frequently with butyl-chloral hydrate.

*Dose*.— $\frac{1}{2}$  to 2 milligrams ( $\frac{1}{120}$  to  $\frac{1}{32}$  grain).

NOTE.—It should be observed that Merck's "gelseminin" consists of gelsemine and not gelseminine.

## GELSEMINÆ HYDROCHLORIDUM.

### GELSEMINE HYDROCHLORIDE.



Gelsemine hydrochloride,  $C_{24}H_{28}N_2O_4.HCl$ , is the hydrochloric acid salt of the alkaloid gelsemine.

It occurs in the form of prismatic crystals, or as a white crystalline powder. Soluble in water, but not readily soluble in alcohol.

*Dose*.—1 to 3 milligrams ( $\frac{1}{30}$  to  $\frac{1}{20}$  grain).

NOTE.—Gelsemine hydrochloride must not be confused with gelseminine hydrochloride, which occurs as a yellowish, hygroscopic powder, soluble in water and in alcohol, is intensely poisonous, and is seldom used in medicine.

## GENTIANÆ RADIX.

GENTIAN ROOT.

*Synonym.*—Gentian.

Gentian consists of the dried rhizome and roots of *Gentiana lutea*, Linn. (N.O. Gentianeæ), a perennial herb indigenous to Central Europe. The rhizomes and roots are collected in the autumn and dried. When fresh they are yellowish-white internally, but gradually become darker by slow drying, during which a characteristic odour is developed, a process which is sometimes unduly prolonged. Occasionally they are longitudinally sliced and quickly dried, the drug then being pale in colour and unusually bitter in taste, but this variety is not official.

The drug occurs in nearly cylindrical pieces, about 15 to 20 centimetres long, and seldom exceeding 2·5 centimetres in thickness. It is yellowish-brown in colour, and longitudinally wrinkled. When moist it is tough and flexible, but brittle when dry, the fractured surface being of a reddish-yellow colour. A transverse section exhibits a dark cambium ring, separating a somewhat thick bark from the large central wood, which is largely parenchymatous, and exhibits no distinct radiate structure. The rhizome may be distinguished by the absence of well-marked longitudinal wrinkles, and the presence of transverse annulations. Its odour is characteristic, and its taste at first sweet, afterwards bitter. During the slow drying of the root unduly prolonged hydrolysis and fermentation of the gentianose present may take place, with progressive diminution in the amount of water-soluble substances present in the root. Good gentian root yields about 40 per cent. to cold water; highly fermented root may yield as little as 13 per cent. It leaves, on incineration, from 2·5 to 4·5 per cent. of ash. Both the bark and wood of the root consist chiefly of parenchymatous tissue, the cells of which contain numerous minute crystals, and small oily globules, but at most only an occasional starch grain. The vessels are scattered, and either isolated or in small groups; there are no sclerenchymatous cells or fibres in any part of the drug. Gentian powder is well characterised by the prevailing parenchymatous tissue, by the presence of minute crystals and oily globules, and by the absence of sclerenchymatous cells or fibres, as well as by the absence of starch. Commercial powdered gentian root is not unfrequently grossly adulterated with ground almond shells, olive stones, various oil-cakes, etc., which may readily be detected on microscopical examination.

Fresh gentian root contains three bitter principles, viz., gentiopicroin, gentiin, and gentiamarin, of which the last two only are found in the dry drug, the gentiopicroin having probably been hydrolysed by the fermentative changes which take place to a greater or



less extent by the process of drying. Gentiopicrin forms pale yellow crystals, melting at  $191^{\circ}$ , and hydrolysed by emulsin or by dilute mineral acids to gentiogenin and dextrose. Gentiin, which is present in much smaller quantity, is also crystallisable and glucosidal, but gentiamarin is amorphous. In addition to these substances, gentian root also contains a yellow crystalline acid (gentisin or gentianic acid) and a sugar (gentianose), together with pectin and oily globules, probably of a cholesterol compound. Gentianose is a hexotriose, yielding by partial hydrolysis gentiobiose and lævulose, further hydrolysis splitting up gentiobiose into two molecules of dextrose.

Gentian is a typical bitter, and is used to increase the appetite in recovery from acute diseases, atonic dyspepsia, and the like. Bitters increase the flow of gastric juice by improving the appetite. They excite the nerve-endings of taste, and it is this which induces the flow of gastric juice. Patients suffering from gastric trouble have a perverted taste, and in such conditions a powerful gustatory stimulant is administered; and experience teaches that this is best attained by some sharp and unpleasant impression such as may be obtained by taking a bitter substance. Since, however, the action of bitters is purely on the taste nerve-endings it is obviously irrational to swallow them, and all that pharmacology demands is that the mouth be rinsed out with them. The compound infusion is a suitable vehicle for alkaline or acid digestive "tonics." Extract of gentian is used as a pill excipient, the mucilaginous and saccharine matters extracted from the root forming a mass of good binding power, which, however, is improved by admixture with an equal weight of liquid glucose.

NOTES.—The roots of other species of *Gentiana*—*G. purpurea*, Linn., *G. pannonica*, Scop., *G. punctata*, Linn., are sometimes collected and dried. They are, as a rule, smaller than the official gentian, but possess similar properties. Gentian root of pale colour and very bitter taste is occasionally seen on the market; whether this is the root of *G. lutea*, rapidly dried so as to avoid fermentation, or whether it is the root of different species of *Gentiana*, is at present unknown.

## GERANIOL.

### GERANIOL.



*Synonym.*—Rhodinol.

Geraniol,  $\text{C}_{10}\text{H}_{18}\text{O}$ , is a primary alcohol, isomeric with linalool, and constitutes the chief part of rose oil and palmarosa oil; it also occurs in appreciable quantities in geranium, citronella, lemon-grass, and many other oils. It is found both in the free state and in the form of esters, and may be obtained by making use of its property of combining with calcium chloride to form a crystalline compound, thus:—The oil is triturated with an equal weight of anhydrous calcium chloride, and the mixture, which becomes heated to  $30^{\circ}$  to  $40^{\circ}$ , is cooled in a desiccator. The solid mass thus obtained is

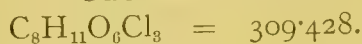
triturerated with anhydrous ether or benzene, filtered under pressure, washed with ether or benzene, and decomposed with water, the oily liquid which separates washed with warm water, and finally distilled in a current of steam.

It occurs as a colourless, somewhat oily liquid, having a sweet rose-like odour, and becoming oxidised on exposure to the air. Specific gravity, 0·880 to 0·883; boiling-point, 230°; refractive index, 1·4766; optically inactive. On oxidation, it is converted into its aldehyde geranial or citral. By heating with acetic anhydride it yields the acetic ester,  $C_{10}H_{17}O$ ,  $C_2H_3O$ , which is a fragrant oil of specific gravity 0·917. Geraniol may be changed to linalool by heating with water to 200° under pressure, whilst it may be obtained from linalool by heating the latter for some time with acetic anhydride.

Geraniol is used largely in perfumery. It must be distinguished from its aldehyde geranial,  $C_{10}H_{16}O$ , which is identical with citral.

## GLUCOCHLORAL.

GLUCOCHLORAL.



*Synonyms.*—Chloralose; Anhydro-glucochloral;  $\alpha$ -Chloralose.

Glucochloral,  $C_8H_{11}O_6Cl_3$ , is a compound prepared by heating equal parts of anhydrous chloral and dry glucose in a sealed tube at 100°, for about an hour. After cooling, the resulting mass is treated with a little water and then with boiling ether. The ether-soluble portions are repeatedly distilled with water to remove chloral, and the product, which consists of the isomers chloralose and para-chloralose, is crystallised from water to separate the less soluble para-compound.

It occurs in the form of fine, colourless, acicular crystals, having a bitter and nauseous taste. Soluble in cold water (1 in 170); freely soluble in hot water, alcohol, ether, and glacial acetic acid. Melting-point, 185°; it volatilises without decomposition. The para-compound, or  $\beta$ -chloralose, is insoluble in cold water; slightly soluble in hot water, more so in hot alcohol and ether, and melts at 229°.

Glucochloral is a hypnotic and sedative for use in simple insomnia; it is less successful in sleeplessness due to pain. It is more slowly absorbed than chloral, but is a powerful hypnotic. Glucochloral resembles morphine in depressing the psychical centres and appreciation of pain, while it increases the lower reflexes, until strychnine-like convulsions are produced; unlike chloral it has little effect on the heart. It should be used with care, as its effects are uncertain, and symptoms of poisoning have followed a dose of 5 decigrams (8 grains). The dose usually given is 3 decigrams (5 grains), best enclosed in a cachet. Doses of 2 to 3 decigrams (3 to 5 grains) have been recommended in sea-sickness.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

**GLUCOSUM.****GLUCOSE.**

*Synonyms.*—Solid Glucose ; Dextrose ; Grape Sugar.

Glucose is obtained by the inversion of starch, the process employed being similar to that described under Glucosum Liquidum, but more acid is employed to prevent any dextrin remaining unconverted, and conversion carried a stage farther. The syrup is evaporated until its specific gravity is 1.370 on cooling, and it is then allowed to crystallise.

The solid glucose occurs in the form of crystalline masses, or anhydrous hard crusts. Specific gravity, 1.540 to 1.570. It crystallises from water or dilute alcohol with one molecule of water, forming nodular masses (melting-point, 86°), but it loses its water of crystallisation at 110°; anhydrous glucose is deposited from concentrated aqueous solutions at a temperature of 30° to 35°. Alcoholic solutions also deposit anhydrous glucose, in microscopic needles which melt at 140°. The substance possesses the same properties as Glucosum Liquidum.

It contains about 60 per cent. of dextrose, together with an unfermentable, dextrin-like substance named gallesine, and about 0.5 per cent. of residual calcium sulphate.

Glucose is added to nutritive enemata for rectal alimentation; for this purpose, liquid glucose is not suitable, and pure dextrose in powder should be used. Pure glucose is largely employed in the preparation of nutrient media for use in bacteriology. Solid glucose is also used in the preparation of certain compressed tablets.

**GLUCOSUM LIQUIDUM.****LIQUID GLUCOSE.**

Liquid glucose of commerce is a saccharine substance obtained by the hydrolysis of starch. The starch is treated with diluted sulphuric acid, and steam passed through the mixture; or the starch and diluted acid are enclosed in strong copper cylinders and subjected to the action of steam under pressure. When hydrolysis is complete and the mixture ceases to give a reaction with iodine, the acid is neutralised by chalk or marble dust, the solution treated with animal charcoal, filtered, and evaporated *in vacuo*. If sulphuric acid be used it must be free from arsenium, as the latter would pass into the glucose and consequently into any preparations made from it.

Commercial liquid glucose occurs as a clear, viscid, almost colourless and odourless syrup, with a sweet taste. Soluble in water, alcohol, and glycerin. Its solutions usually have a faintly acid reaction. It consists chiefly of dextrose, but dextrin is also present along with variable percentage of unfermentable carbohydrates, among these being the dextrin-like substance, gallesine. Glucose undergoes direct vinous fermentation, reduces Fehling's solution at



once when heated, and is decomposed by alkalies, becoming brown and partially changed to mannose and fructose. When warmed with solution of ammonio nitrate of silver, metallic silver is precipitated; with solution of mercuric cyanide in solution of potassium hydroxide, metallic mercury is thrown down. Traces of calcium sulphate are frequently present in commercial liquid glucose, being derived from the chalk used to neutralise the excess of acid employed in the process of manufacture. Sulphurous acid, in the form of sulphites, is nearly always found in commercial glucose, being used as a preservative or for decolourising. It is frequently present in such quantity as to give a distinctly sulphurous taste.

Liquid glucose is used chiefly as a pill excipient, either alone or diluted with two parts of syrup, as in the official syrup of glucose, or, better, diluted with an equal quantity of syrup. For coloured pills many dispensers prefer a mixture of equal weights of extract of gentian and liquid glucose. Liquid glucose is specially suitable for the preparation of pills containing ferrous carbonate. It preserves the ferrous salt from oxidation, and will even reduce any ferric salt present. Conversely, it should not be used where such deoxidation is to be avoided, as in the preparation of pills containing cupric salts. A solution of glucose has been recommended for use by subcutaneous injection as a restorative after severe operations, or as a nutritive in wasting diseases, a litre of 5 per cent. solution (which is isotonic with the blood) being injected in the course of twenty-four hours; it has also been used to augment the movements of the uterus.

## GLUSIDUM.

### GLUSIDE.



*Synonyms.*—Saccharin; Glucosimide; Benzosulphimidum.

Gluside,  $\text{C}_6\text{H}_4\text{COSO}_2\text{NH}$ , may be prepared by treating toluene with concentrated sulphuric acid at  $100^\circ$ , thus forming ortho- and para-toluenesulphonic acids,  $\text{C}_6\text{H}_4(\text{CH}_3)\text{SO}_3\text{H}_2$ . The acids are converted into the calcium salts, and these in turn into sodium salts; the latter, by the action of phosphorus pentachloride, yield a mixture of ortho- and para-toluenesulpho-chlorides, from which, on cooling, the para-salt is got rid of by crystallisation. The ortho-compound is then treated with dry ammonia gas, whereby ortho-toluene sulphamide,  $\text{C}_6\text{H}_4(\text{CH}_3)\text{SO}_2\text{NH}_2$ , is formed. This is next oxidised with potassium permanganate, and the resulting potassium compound decomposed by means of an acid; orthosulphamido-benzoic acid is thus formed, but splits up into its anhydride, gluside, and water.

It occurs as a light white micro-crystalline powder. Only slightly soluble in cold water (1 in 400), but very soluble in boiling water (1 in 28), the stronger solutions having an intensely sweet

taste; also soluble in alcohol (1 in 30) and glycerin (1 in 50), slightly soluble in ether and chloroform, very soluble in diluted solution of ammonia and in solution of sodium bicarbonate. It forms neutral "soluble gluside," with the latter, carbon dioxide being evolved; 100 of gluside yield 113 of this compound, which is very soluble in water. Gluside is not a chemically pure substance; but, when recrystallised from hot water, the crystals should melt at a temperature between  $218.8^{\circ}$  and  $220^{\circ}$ . It should be free from sugar and other substances blackened by warm sulphuric acid, and from parasulph-amido-benzoic acid. If evaporated with excess of solution of potassium hydroxide, the residue maintained in a state of semi-fusion for a few minutes, cooled, dissolved in water, faintly acidulated with hydrochloric acid, and a few drops of solution of ferric chloride added, a reddish-brown or purple colour is produced. When heated with resorcin and concentrated sulphuric acid and then treated with excess of a solution of sodium hydroxide a green fluorescence is obtained.

Gluside is used as a sweetening agent, and as a substitute for sugar in diabetes, corpulence, liver disease, and generally where the use of sugar is undesirable. It is commonly employed in the form of soluble gluside, as that preparation is much more soluble and more palatable, besides being without the disagreeable after-taste of pure gluside. For use in dispensing, elixir of gluside is suitable; it contains 6 centigrams (1 grain) in 12 decimils (20 minims), and this quantity is sufficient to sweeten 180 to 240 mls (6 to 8 fluid ounces) of mixture. It has not yet been shown whether the prolonged use of gluside is harmful or not. All preparations of saccharin should be entirely free from starch and sugar.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

NOTE.—Glusidum, B.P., corresponds to saccharin 550, but an inferior preparation in commerce is only 330 times sweeter than sugar.

## GLUSIDUM SOLUBILE.

SOLUBLE GLUSIDE.



*Synonym.*—Soluble Saccharin.

Soluble gluside,  $\text{NaC}_7\text{H}_5\text{NSO}_3$ , may be prepared by neutralising an aqueous solution of gluside with sodium carbonate or bicarbonate, and slowly crystallising, or evaporating to dryness and powdering.

It occurs in yellowish-white, granular, microcrystalline masses, or as a crystalline powder. Easily soluble in water, the solution having an intensely sweet taste. It is not blackened by sulphuric acid even when gently warmed for a short time (absence of sugar, etc.). Treated with excess of solution of potassium hydroxide, the mixture evaporated and the residue maintained in a state of semi-fusion for a few minutes, cooled, dissolved in water, faintly

acidulated with hydrochloric acid and treated with solution of ferric chloride, a reddish-brown or purplish colour is produced.

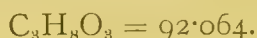
Soluble gluside is more suitable as a sweetening agent than ordinary gluside. It is used in the form of compressed tablets containing the equivalent of 16 to 30 milligrams ( $\frac{1}{4}$  to  $\frac{1}{2}$  grain) of pure gluside, and may also be obtained for culinary purposes in the form of fine granules.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

*NOTE.*—For the extemporaneous production of soluble gluside a powder may be prepared, containing 100 of gluside mixed with 46 of sodium bicarbonate.

## GLYCERINUM.

GLYCERIN.



*Synonyms.*—Glycerol; Glycerine.

Glycerin is obtained by the action of alkalis or superheated steam on fats or fixed oils, and consists of the trihydric alcohol, glycerol,  $\text{C}_3\text{H}_5(\text{OH})_3$ , mixed with a small proportion of water.

It occurs as a clear, colourless, odourless, hygroscopic liquid of a syrupy consistence and a sweet taste; miscible with water and alcohol, insoluble in ether, chloroform, and oils, neutral to litmus. Specific gravity, 1.260. Glycerin should be free from lead, copper, iron, calcium, potassium, sodium, ammonium, chlorides, sulphates, grape and cane sugars, foreign organic matter, butyric acid, and fixed mineral matter. It should not contain more than 1 part of arsenium in 250000, and usually contains considerably less.

Applied to the skin, glycerin acts as an emollient, somewhat resembling the fats in its action, though more irritating. If the skin be abraded, some smarting arises; for its emollient action, glycerin is diluted with one or two volumes of rose water. For chilblains, chapped hands, and in eczema and prurigo, glycerin of starch is an excellent emollient. Applied undiluted to mucous membranes, it takes up moisture from the mucous secretions and increases the penetrative action of any drugs held in solution. If 4 to 16 mils (1 to 4 fluid drachms) of glycerin be injected into the rectum, it augments peristalsis and produces an evacuation of the bowels. The effect is reflex, and is set up by the local irritation arising from absorption of moisture from the mucous surfaces. Suppositories of glycerin have a similar effect (see Suppositorium Glycerini). Taken internally, glycerin is demulcent, laxative, antiseptic, and to a slight extent nutritious. It is a favourite constituent of soothing linctuses for use against cough, and in the form of pastilles, prepared with a gelatin basis, and flavoured with fruit pastes and essences, or medicated with astringents and antiseptics, it is the commonest emollient for the throat. Glycerin is employed as a sweetening agent in place of syrup, especially with perchloride of iron, and preparations of cascara or cinchona. For



use as a pill excipient it should be diluted with equal quantities of syrup and mucilage of acacia; pills made with undiluted glycerin are too prone to absorb moisture. Glycerin has remarkable powers as a solvent and preservative, and is therefore applied to innumerable pharmaceutical uses. It forms the basis of the so-called "aqueous" or non-alcoholic tinctures, and is largely employed as an antiseptic in the preparation of solutions of the digestive ferments and other glandular secretions.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

*NOTE.*—Glycerinum, U.S.P., contains not less than 95 per cent. of absolute glycerol, and its specific gravity is 1.250 (about 1.246 at 25°).

### GLYCERINUM ACETOMORPHINÆ.

#### GLYCERIN OF ACETOMORPHINE.

Acetomorphine Hydrochloride	...	...	0.05
Chloroform	...	...	0.20
Alcohol	...	...	0.40
Syrup of Roses	...	...	50.00
Distilled Water	...	...	10.00
Glycerin, sufficient to produce	...	...	100.00

Dissolve the acetomorphine hydrochloride in the distilled water, and gradually add the syrup of roses, shaking after each addition; then add the chloroform, previously dissolved in the alcohol, and sufficient glycerin to make up the required volume.

Glycerin of acetomorphine is used to allay cough, and is useful in bronchitis, asthma, and laryngitis.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTES.*—This preparation contains about  $\frac{1}{38}$  grain of acetomorphine hydrochloride in 1 fluid drachm. A similar preparation is known as Glycerinum Heroin.

### GLYCERINUM ACIDI BORICI.

#### GLYCERIN OF BORIC ACID.

*Synonym.*—Glyceritum Boroglycerini.

Boric Acid, in fine powder	...	...	30.00
Glycerin, by weight, sufficient to produce	...	...	100.00

Place 45 of the glycerin in a weighed dish, heat to a temperature not exceeding 150°, then gradually, and with constant stirring, add the boric acid. Continue the application of heat after solution is complete, stirring frequently, and breaking the surface film, until the weight of the mixture has been reduced to 50; then add 50 of glycerin and mix thoroughly. The product should weigh 100.

Glycerin of boric acid is used as an antiseptic paint for the throat; its viscosity procures prolonged action of the medicament. It may be diluted with water to make antiseptic lotions.

*NOTE.*—Glyceritum Boroglycerini, U.S.P., is prepared by heating 31 of boric acid with sufficient glycerin to produce 100 by weight (see Boroglycerinum).

**GLYCERINUM ACIDI CARBOLICI.**

## GLYCERIN OF CARBOLIC ACID.

*Synonyms.*—Glycerin of Phenol; Glyceritum Phenolis.

Carbolic Acid ... ..	20'00
Glycerin, sufficient to produce ... ..	100'00

Dissolve the carbolic acid by trituration with the glycerin.

Mixed with an equal quantity of glycerin or glycerin of tannin, glycerin of carbolic acid is used as a paint for inflammatory conditions of mucous membranes, as of the mouth and throat. It is also used in the preparation of gargles (1 part to 6 or 8 of water). The glycerin limits and prolongs the action of the phenol, and weakens its action, owing to its viscosity.

**GLYCERINUM ACIDI TANNICI.**

## GLYCERIN OF TANNIC ACID.

*Synonym.*—Glycerin and Tannin.

Tannic Acid ... ..	20'00
Glycerin, sufficient to produce ... ..	100'00

Dissolve the tannic acid by trituration with the glycerin.

Glycerin of tannic acid is used as a paint in relaxed throat, and as a gargle or spray solution (1 part with 6 or 8 parts of water) in stomatitis, ozæna, inflamed tonsils, and pharyngeal irritation.

NOTE.—Glyceritum Acidi Tannici, U.S.P., contains 20 per cent. by weight of tannic acid.

**GLYCERINUM ALUMINIS.**

## GLYCERIN OF ALUM.

Alum, in powder ... ..	16'66
Distilled Water... ..	6'25
Glycerin, sufficient to produce ... ..	100'00

Dissolve the alum by trituration with the distilled water and glycerin, facilitating solution, if necessary, by the application of gentle warmth. The clear liquid should be decanted from any sediment that may be formed after standing awhile.

Glycerin of alum is useful in ptyalism, ulceration of the mouth and gums, pharyngitis, etc. It is used as an astringent paint for the throat in relaxed conditions, and may be mixed with an equal quantity of glycerin of tannin. Diluted with 8 parts of water or acid infusion of roses, it forms a gargle or spray solution.

**GLYCERINUM AMYLI.**

## GLYCERIN OF STARCH.

Starch ... ..	11'00
Distilled Water ... ..	16'50
Glycerin ... ..	71'50

Heat the starch with the glycerin and distilled water on a sand bath, with constant stirring, until a clear jelly is obtained.

Glycerin of starch is a soothing and emollient application for the skin, and is used for "chapped" hands and chilblains. It is much improved by the addition of a small proportion of tragacanth.

NOTE.—Glyceritum Amyli, U.S.P., is prepared with 10 of starch, 10 of water, and 80 by weight of glycerin.

### GLYCERINUM ATROPINÆ.

#### GLYCERIN OF ATROPINE.

Atropine Sulphate	...	...	...	0'25
Distilled Water...	...	...	...	25'00
Compound Tincture of Lavender	...	...	...	1'00
Glycerin, sufficient to produce	...	...	...	100'00

Dissolve the atropine sulphate in the distilled water, and add the other ingredients.

Glycerin of atropine is more constant in strength than Glycerinum Belladonnæ, for which it is a cleanly substitute, since it does not stain the skin or clothes of the patient.

### GLYCERINUM BELLADONNÆ.

#### GLYCERIN OF BELLADONNA.

Green Extract of Belladonna	...	...	...	50'00
Distilled Water, boiling	...	...	...	6'25
Glycerin, sufficient to produce	...	...	...	100'00

Rub together the extract of belladonna and the boiling distilled water to produce a smooth paste, then add the glycerin, and strain through muslin.

Glycerin of belladonna is used as a local application to allay pain and inflammation; it is also applied to the breasts of nursing women to arrest secretion.

### GLYCERINUM BISMUTHI CARBONATIS.

#### GLYCERIN OF BISMUTH CARBONATE.

Bismuth Nitrate, in crystals	...	...	...	100'00
Nitric Acid	...	...	...	15'00
Ammonium Carbonate	...	...	...	50'00
Distilled Water	...	...	...	360'00
Glycerin, sufficient to produce	...	...	...	100'00

Dilute the nitric acid with 60 of the water, and dissolve the bismuth nitrate in the mixture, then pour the solution very slowly and



with constant stirring into a solution of the ammonium carbonate in 300 of water. Allow the precipitate to subside, wash twice by decantation, collect on a fine muslin filter, drain and mix the residue with sufficient glycerin to make up the required volume. The product contains about 50 per cent. of bismuth carbonate.

This preparation contains bismuth carbonate in a very fine state of subdivision, and therefore in a particularly active condition, therapeutically. Mixtures prepared therewith contain the bismuth in a better state of suspension than when ordinary bismuth carbonate is used, especially if compound infusion of orange be used as the vehicle.

*Dose.*—6 to 24 decimils (10 to 40 minims).

*NOTE.*—It is not possible to make this preparation so condensed as 1 in 2 unless the bismuth solution be added very slowly to the ammonium carbonate solution, with constant stirring; the more quickly the solutions are mixed the bulkier will be the precipitate.

### GLYCERINUM BORACIS.

#### GLYCERIN OF BORAX.

Borax	...	...	...	...	...	14.25
Glycerin	...	...	...	...	...	85.50

Dissolve the borax by trituration with the glycerin.

Glycerin of borax is used as an application to the gums, tongue, and throat, in aphthous ulceration, mercurial salivation, and to cleanse the mouths of children as a preventive of thrush. It is acid in reaction and effervesces with carbonates.

### GLYCERINUM CARMINI.

#### GLYCERIN OF CARMINE.

Carmine	...	...	...	...	...	12.50
Solution of Ammonia	...	...	...	...	...	20.00
Glycerin	...	...	...	...	...	75.00
Distilled Water, sufficient to produce	...	...	...	...	...	100.00

Mix the carmine with 12.5 of distilled water and 16 of the solution of ammonia, gradually add the glycerin, and heat on a water-bath till free from ammoniacal odour; when cold, add the remainder of the solution of ammonia, and make up the required volume with distilled water.

Glycerin of carmine is but slightly alkaline, and has a pure carmine tint. It is a suitable colouring agent for neutral or alkaline liquids, 3 decimils (5 minims) being added to 30 mils (1 fluid ounce) of mixture. For many purposes, however, Glycerinum Cocci will be found more suitable.

**GLYCERINUM CINCHONÆ.**

## GLYCERIN OF CINCHONA.

Liquid Extract of Cinchona	...	...	...	20'00
Tragacanth, in powder...	...	...	...	0'75
Alcohol	...	...	...	2'50
Distilled Water...	...	...	...	20'00
Glycerin, sufficient to produce	...	...	...	100'00

Mix the tragacanth with the alcohol, add the distilled water, shake thoroughly, then gradually add the liquid extract of cinchona and sufficient glycerin to make up the required volume, and again shake thoroughly.

This is a palatable preparation of cinchona for use in a concentrated form. It is of the same strength as Tinctura Cinchonæ, containing 1 per cent. of total alkaloid.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds in strength to Tinctura Cinchonæ, containing 1 per cent. of total alkaloids.

**GLYCERINUM COCCI.**

## GLYCERIN OF COCHINEAL.

Cochineal	...	...	...	...	20'00
Potassium Carbonate	...	...	...	...	1'00
Potassium Citrate	...	...	...	...	10'00
Glycerin	...	...	...	...	20'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the potassium carbonate in 60 of the distilled water, and digest the unbruised cochineal in the solution, on a water-bath, for about six hours, or until exhausted; then strain, cool, add the glycerin and potassium citrate, and make up the required volume with distilled water. The product is a somewhat thick, dark crimson liquid.

This preparation is useful for imparting a rich red colour to preparations in which the presence of alcohol is not desired. A similar preparation containing alcohol is Liquor Cocci.

**GLYCERINUM CROCI.**

## GLYCERIN OF SAFFRON.

Saffron	...	...	...	...	2'50
Glycerin	...	...	...	...	50'00
Alcohol (60 per cent.)	...	...	...	...	50'00

Mix the glycerin and the alcohol; then digest the saffron in the mixture for an hour at a gentle heat and filter.

This preparation remains clear and its colour is permanent. It is used to prepare Syrupus Croci, and as a colouring and flavouring agent for mixtures, 3 to 6 decimils (5 to 10 minims) being added to 30 mils (1 fluid ounce) of mixture.

## GLYCERINUM FERRI ET QUININÆ ET STRYCHNINÆ PHOSPHATUM.

GLYCERIN OF IRON, QUININE, AND STRYCHNINE PHOSPHATES.

*Synonym.*—Glyceritum Ferri, Quininæ et Strychninæ Phosphatum.

Soluble Iron Phosphate...	...	...	...	8.00
Quinine ...	...	...	...	10.40
Strychnine ...	...	...	...	0.08
Concentrated Phosphoric Acid...	...	...	...	20.00
Glycerin ...	...	...	...	50.00
Distilled Water, sufficient to produce ...	...	...	...	100.00

Dissolve the iron phosphate in 20 of water by heating in a porcelain dish to a temperature not exceeding 70°, then add the phosphoric acid with the strychnine, quinine, and sufficient distilled water to make the product measure 50, stir until solution is effected, add the glycerin, mix, and filter if necessary.

This preparation is a tonic, and has similar properties to Easton's Syrup, but contains about 50 per cent. more strychnine than the latter.

*Dose.*— $\frac{1}{2}$  to 1 mil (8 to 15 minims).

*NOTE.*—This preparation contains the equivalent of about  $\frac{1}{23}$  grain of strychnine and  $5\frac{3}{8}$  grains of quinine in 1 fluid drachm.

## GLYCERINUM GLYCEROPHOSPHATUM COMPOSITUM.

COMPOUND GLYCERIN OF GLYCEROPHOSPHATES.

*Synonym.*—Glycerol Glycerophosphatis.

Calcium Glycerophosphate ...	...	...	2.00
Potassium Glycerophosphate ...	...	...	1.00
Sodium Glycerophosphate ...	...	...	1.00
Magnesium Glycerophosphate ...	...	...	1.00
Iron Glycerophosphate, in scales ...	...	...	0.50
Citric Acid ...	...	...	0.25
Cudbear ...	...	...	0.15
Chloroform ...	...	...	0.05
Alcohol ...	...	...	0.40
Orange-flower Water, undiluted ...	...	...	1.25
Cherry-laurel Water ...	...	...	2.00
Glycerin ...	...	...	50.00
Distilled Water, sufficient to produce ...	...	...	100.00

Boil the cudbear for ten minutes in 40 of the distilled water; filter, and dissolve the glycerophosphates and citric acid in the warm filtrate. When cold, add the chloroform dissolved in the alcohol, the aromatic waters, the glycerin, and sufficient distilled water to make up the required volume.

This preparation is used instead of compound syrup of glycerophosphates in cases where the sugar in the latter would be objectionable.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).



## GLYCERINUM GLYCEROPHOSPHATUM CUM MEDULLA RUBRA.

GLYCERIN OF GLYCEROPHOSPHATES WITH RED BONE MARROW.

*Synonym.*—Glycerol Glycerophosphatis cum Medulla Rubra.

Calcium Glycerophosphate	...	...	...	1.00
Potassium Glycerophosphate	...	...	...	0.50
Sodium Glycerophosphate	...	...	...	0.50
Magnesium Glycerophosphate	...	...	...	0.50
Iron Glycerophosphate, in scales	...	...	...	0.25
Manganese Glycerophosphate	...	...	...	0.25
Citric Acid	...	...	...	0.18
Chloroform	...	...	...	0.05
Alcohol	...	...	...	0.50
Orange-flower Water, undiluted	...	...	...	0.75
Cherry-laurel Water	...	...	...	1.00
Extract of Red Bone Marrow...	...	...	...	50.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the glycerophosphates and the acid in 45 of distilled water, filter, add the other ingredients, and sufficient distilled water to make up the required volume.

This preparation contains only half the quantity of glycerophosphates present in Glycerinum Glycerophosphatum Compositum, with the addition of manganese glycerophosphate and the glycerin extract of red bone marrow.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

## GLYCERINUM HYDRASTIS.

GLYCERIN OF HYDRASTIS.

*Synonym.*—Glyceritum Hydrastis.

Hydrastis, in No. 60 Powder	...	...	...	100.00
Glycerin	...	...	...	50.00
Alcohol, a sufficient quantity.				
Distilled Water, sufficient to produce	...	...	...	100.00

Moisten the hydrastis with 35 of alcohol, pack it in a percolator, add enough alcohol to saturate and cover the powder, and macerate for forty-eight hours; then allow percolation to proceed, adding more alcohol until the drug is practically exhausted. Recover most of the alcohol by distillation, pour the concentrated liquid into 50 of ice-cold distilled water, and set the mixture aside in a cool place for twenty-four hours; then filter, pass enough distilled water through the filter to make the filtrate measure 50, add the glycerin, and mix thoroughly.

This preparation is free from the resinous constituents of hydrastis, and is readily miscible with water.

*Dose.*—1 to 4 mils (15 to 60 minims).

**GLYCERINUM HYPOPHOSPHITUM.**

GLYCERIN OF HYPOPHOSPHITES.

*Synonym.*—Glycerol Hypophosphitis.

Calcium Hypophosphite	...	...	...	1.50
Manganese Hypophosphite	...	...	...	0.75
Potassium Hypophosphite	...	...	...	1.50
Quinine Hypophosphite	...	...	...	0.75
Strychnine Hypophosphite	...	...	...	0.025
Strong Solution of Ferric Hypophosphite	...	...	...	20.00
Hypophosphorous Acid	...	...	...	10.00
Distilled Water	...	...	...	15.00
Glycerin, sufficient to produce	...	...	...	100.00

Dissolve the hypophosphites in the distilled water, and add the other ingredients, with sufficient glycerin to produce the required volume.

*Dose.*—4 mils (1 fluid drachm).

*NOTE.*—This preparation contains about  $\frac{1}{2}$  grain of strychnine hypophosphite, and  $\frac{2}{3}$  grain of quinine hypophosphite in 1 fluid drachm).

**GLYCERINUM IODI.**

GLYCERIN OF IODINE.

*Synonyms.*—Injectio Iodi; Iodo-glycerin Solution; Morton's Fluid.

Iodine	...	...	...	...	...	2.00
Potassium Iodide	...	...	...	...	...	6.00
Distilled Water...	...	...	...	...	...	5.00
Glycerin, sufficient to produce	...	...	...	...	...	100.00

Dissolve the potassium iodide in the distilled water, add the iodine, and, when dissolved, sufficient glycerin to make up the required volume.

Glycerin of iodine is used as an injection, 2 mils (30 minims), into tumours and as an application to the skin. It is less hardening to the skin than tincture of iodine.

*NOTE.*—Glycerinum Iodi sine Aqua is sometimes required, of the same strength as the above, the water being replaced by glycerin.

**GLYCERINUM IPECACUANHÆ.**

GLYCERIN OF IPECACUANHA.

*Synonym.*—Glycerol Ipecacuanhæ.

Vinegar of Ipecacuanha	...	...	...	50.00
Glycerin	...	...	...	50.00

Mix the vinegar of ipecacuanha with the glycerin.

This preparation is used for children as an expectorant in croup and whooping-cough.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**GLYCERINUM PANCREATINI.**

GLYCERIN OF PANCREATIN.

*Synonym.*—Glycerol of Pancreatin.

Pancreatin	...	...	...	...	...	10·00
Glycerin...	...	...	...	...	...	50·00
Simple Elixir	...	...	...	...	...	5·00
Distilled Water, sufficient to produce	...	...	...	...	...	100·00

Dissolve the pancreatin in the water and glycerin and add the simple elixir.

Glycerin of pancreatin is a digestive, for use in intestinal dyspepsia, and is best given in neutral or alkaline combination. As pancreatin is destroyed by the hydrochloric acid of the stomach, and so ceases to act as soon as this is secreted, the glycerin is best administered about three hours after a meal.

*Dose.*—1 to 2 mls (15 to 30 minims).

**GLYCERINUM PAPAINI.**

GLYCERIN OF PAPAIN.

Papain	...	...	...	...	...	8·00
Diluted Hydrochloric Acid	...	...	...	...	...	8·00
Simple Elixir	...	...	...	...	...	5·00
Glycerin, sufficient to produce	...	...	...	...	...	100·00

Dissolve the papain in the glycerin and hydrochloric acid, then add the simple elixir.

Glycerin of papain is a digestive, for use in painful dyspepsia and gastric fermentation instead of pancreatin. It acts in neutral, alkaline, or slightly acid solutions.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**GLYCERINUM PEPSINI.**

GLYCERIN OF PEPSIN.

Pepsin	...	...	...	...	...	9·15
Hydrochloric Acid	...	...	...	...	...	1·15
Glycerin...	...	...	...	...	...	60·00
Distilled Water, sufficient to produce	...	...	...	...	...	100·00

Add the pepsin to 30 of the distilled water, previously mixed with the hydrochloric acid and glycerin, shake well, and set aside for a week; then decant or filter, and add sufficient water to make up the required volume.

Glycerin of pepsin is a digestive, for use where there is deficiency of gastric juice, such as may occur in almost any chronic wasting disease, but especially in cancer of the stomach.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

*NOTE.*—This preparation contains about 5 grains of pepsin in 1 fluid drachm.



**GLYCERINUM PEPSINI FORTIUS.**

STRONGER GLYCERIN OF PEPSIN.

*Synonym.*—Glycerol of Pepsin.

Pepsin	...	...	...	...	...	15'00
Diluted Hydrochloric Acid	...	...	...	...	...	5'00
Glycerin	...	...	...	...	...	50'00
Simple Elixir	...	...	...	...	...	5'00
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Add the pepsin to 30 of the distilled water, previously mixed with the hydrochloric acid and glycerin, shake well, and set aside until clear; then decant or filter and add the simple elixir, with sufficient distilled water, if necessary, to make up the required volume.

*Dose.*—2 to 4 mils. ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation contains about 8 grains of pepsin in 1 fluid drachm.

**GLYCERINUM PLUMBI SUBACETATIS.**

GLYCERIN OF LEAD SUBACETATE.

Lead Acetate	...	...	...	...	...	15'00
Lead Oxide, in powder	...	...	...	...	...	10'50
Glycerin	...	...	...	...	...	60'00
Distilled Water	...	...	...	...	...	36'00

Add the lead acetate and oxide to the glycerin and distilled water, boil the mixture for fifteen minutes; then filter, and evaporate at a temperature not exceeding 105·5°, until the weight of the product is reduced to 98·25. Specific gravity, 1·48.

Glycerin of lead subacetate, diluted with paraffin ointment or with 4 to 6 parts of glycerin, forms an emollient and healing application in eczema and chronic ulcerations. Lotions (1 part to 8 parts of water) are used in pruritus ani and (1 part to 40 parts of water) as vaginal injections.

*NOTE.*—This preparation is more conveniently made with half the quantity of distilled water.

**GLYCERINUM SODII CINNAMATIS.**

GLYCERIN OF SODIUM CINNAMATE.

Sodium Cinnamate, in fine powder	...	...	...	...	...	5'00
Glycerin	...	...	...	...	...	95'00

Mix the sodium cinnamate with the glycerin and heat in a flask plugged with cotton wool, on a sand bath, till solution is complete (temperature required about 180°), then transfer to sterilised bottles.

This preparation was formerly recommended for hypodermic injection in cancer and tuberculosis, on the supposition that it causes active leucocytosis, but this is not the case so far as man is concerned.

*Dose.*—3 to 6 mils (45 to 90 minims).

**GLYCERINUM THYMOL COMPOSITUM.**

COMPOUND GLYCERIN OF THYMOL.

*Synonym.*—Glycerinum Thymol Alkalinum.

Sodium Bicarbonate	...	...	...	...	1'00
Sodium Biborate	...	...	...	...	2'00
Sodium Benzoate	...	...	...	...	0'75
Sodium Salicylate	...	...	...	...	0'50
Menthol...	...	...	...	...	0'03
Thymol ...	...	...	...	...	0'05
Eucalyptol	...	...	...	...	0'13
Oil of Pine	...	...	...	...	0'05
Oil of Wintergreen	...	...	...	...	0'03
Alcohol ...	...	...	...	...	2'50
Glycerin...	...	...	...	...	10'00
Solution of Carmine	...	...	...	...	0'50
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the sodium salts in the water, add the glycerin and solution of carmine, then add the menthol, thymol, and oils previously dissolved in the alcohol.

This preparation is used as an antiseptic and anticatarrhal wash. It is applied, diluted with 2 to 5 parts of water, as a spray solution to the throat and nose, or used as a nasal wash in a glass irrigator. A similar solution is used to cleanse the aural cavities, and as a gargle and mouth-wash.

**GLYCERINUM TRAGACANTHÆ.**

GLYCERIN OF TRAGACANTH.

Tragacanth, in powder...	...	...	...	...	20'00
Glycerin...	...	...	...	...	60'00
Distilled Water...	...	...	...	...	20'00

Add the tragacanth to the glycerin, mix, add the water, and triturate until the product is homogeneous,

Glycerin of tragacanth, used sparingly, is a valuable pill-excipient. The mass should be well beaten and as little excipient used as possible, otherwise the pills will be difficult to round, and liable to absorb moisture.

**GLYCOGELATINUM.**

GLYCOGELATIN.

Gelatin	...	...	...	...	...	12'00
Glycerin	...	...	...	...	...	40'00
Distilled Water...	...	...	...	...	...	20'00
Orange-flower Water	...	...	...	...	...	20'00
Sugar	...	...	...	...	...	5'00
Citric Acid	...	...	...	...	...	2'00
Oil of Lemon	...	...	...	...	...	0'10
Solution of Carmine, a sufficient quantity.						

Soak the gelatin in the distilled water, add the glycerin and dissolve by heating gently on a water-bath; add the orange-flower water, sugar, and citric acid, and enough solution of carmine to give a red colour; mix thoroughly, strain through muslin, and allow it to solidify.

Glycogelatin is used as a basis for throat pastilles, the medicament being dissolved or suspended in the melted glyco-gelatin, the mixture poured into trays to solidify, and cut up into the required number of pastilles, or the melted mass may be poured into suitable pastille moulds.

### GLYCYRRHIZÆ RADIX.

LIQUORICE ROOT.

*Synonyms.*—Glycyrrhiza; Licorice Root.

Liquorice root consists of the dried peeled root and peeled underground stem of *Glycyrrhiza glabra*, Linn. (N.O. Leguminosæ), and other species. The plants are widely distributed over Southern Europe, and are cultivated to a limited extent in England, but the official drug is imported chiefly from Spain. In the autumn, the whole of the underground part of the plant is collected, peeled, and carefully dried.

Peeled Spanish liquorice root occurs in long cylindrical pieces, varying usually from 1 to 2 centimetres in thickness. Its surface is yellow in colour, and nearly smooth, but somewhat fibrous, owing to the exposure of the bast fibres caused by the peeling. The fracture is fibrous in the bark and splintery in the wood. A smoothed transverse section appears dense, and exhibits a yellow radiate wood, with large vessels, and very numerous medullary rays; it also exhibits a comparatively wide bark, containing numerous radially arranged yellowish groups of strongly thickened bast fibres, accompanied by small prismatic crystals of calcium oxalate; groups of sieve tissue are also numerous, the outer ones being collapsed. The medullary rays of the wood are three or four cells wide, and separate the wood bundles, which are characterised by the presence of large ( $100\mu$  wide), yellow coloured vessels, the pores of which are elongated or large, areolated and rounded, or angular. There is an abundance of starch grains and of calcium oxalate crystals in the parenchyma; the former are small ( $3\mu$  to  $15\mu$ ) and rounded or ovoid in shape, the crystals are prismatic ( $10\mu$  to  $30\mu$ ). Liquorice powder is characterised by the yellowish groups of thick-walled bast fibres, accompanied by regular rows of cells with prismatic crystals of calcium oxalate; by the abundance of small starch grains ( $3\mu$  to  $15\mu$ ), and by the large, thick-walled, yellow, pitted vessels. The odour of the drug is faint, and its taste characteristic, being sweet and free from any bitterness.

The chief constituent of liquorice root is glycyrrhizic acid, which



has been obtained in colourless crystals, melting at a temperature near  $205^{\circ}$ , and imparts a sweet taste to water in a dilution of 1 to 20000. Glycyrrhizin, which has been obtained by precipitating the aqueous extract of liquorice root with alcohol, and forms, when pure, a white, sweet powder, consists of the calcium and potassium salts of glycyrrhizic acid; it is slightly soluble in water, but combines readily with alkalies to form soluble compounds. The quantity present has been variously estimated at from 2 to 7 per cent. The drug also contains starch (29 per cent.), and asparagin 1.25 per cent. It yields about 2.8 to 3.8 per cent. of ash, and from 15 to 27 per cent. of aqueous extract when dried at  $100^{\circ}$ .

Liquorice root is demulcent and mildly expectorant. For these properties it is a constituent of domestic remedies for cough and bronchitis, generally with decoction of linseed or marshmallow. Powdered liquorice root is used as a flavouring agent in Pulvis Glycyrrhizæ Compositus; for medicinal use the solid and fluid extracts are usually employed. Extractum Glycyrrhizæ enters into the composition of cough lozenges and pastilles with sedatives and expectorants. The liquid extract is used in cough mixtures and to disguise the taste of nauseous medicines, especially the alkaline iodides, ammonium chloride, quinine and liquid extract of cascara. It should, however, be prescribed only in alkaline or neutral solution. Powdered liquorice root is frequently used as a pill excipient.

NOTES.—Russian and Persian liquorice root obtained from *G. glandulifera*, W. and K., is very largely used. It is imported chiefly in the peeled condition, and may be distinguished from the official (Spanish) root by its larger size, more fibrous and less dense structure, and distinct acid after-taste; in addition, it consists almost entirely of root. Glycyrrhiza, U.S.P., may be obtained from either *G. glabra* or *G. glandulifera*; the latter contains an amorphous bitter substance named glycyramarin.

## GLYCYRRHIZINUM AMMONIATUM.

### AMMONIATED GLYCYRRHIZIN.

Liquorice Root, in No. 20 powder ... .. 100.00  
 Distilled Water, a sufficient quantity.  
 Solution of Ammonia, a sufficient quantity.  
 Sulphuric Acid, a sufficient quantity.

Macerate the powder in a mixture of 95 of the water and 5 of solution of ammonia for twenty-four hours, then transfer to a percolator and gradually add water until the percolate measures 100. Slowly and with constant stirring add sulphuric acid to the percolate until a precipitate ceases to form. Collect the precipitate on a strainer, wash until free from acid, redissolve in water with the aid of solution of ammonia, filter if necessary, and repeat the precipitation with sulphuric acid. Again collect, wash, and dissolve the precipitate in a sufficient quantity of solution of ammonia, previously diluted with an equal volume of water. Finally,

evaporate the clear solution to a thin syrup, scale on porcelain tiles or sheets of glass, and preserve the dry product in well-closed vessels.

It occurs in the form of dark brown or brownish-red odourless scales, having a very sweet taste. It is readily soluble in water or diluted alcohol, insoluble in ether, sparingly soluble in strong alcohol. At 100° the scales become darker in colour, and at a higher temperature melt with decomposition; on complete incineration not more than a trace of ash should be left. The aqueous solution treated with excess of acid throws down a precipitate of glycyrrhizin, which, when dissolved in hot water, forms a jelly on cooling, and this when washed with diluted alcohol and dried appears as an amorphous yellow powder having a strong bitter-sweet taste and an acid reaction. The scales consist chiefly of ammonium glycyrrhizate, but may contain a variable proportion of glycyramarin, if Russian or Persian liquorice root be used.

Ammoniated glycyrrhizin is used as a substitute for extract of liquorice in neutral mixtures.

*Dose.*— $\frac{1}{4}$  to 3 decigrams ( $\frac{1}{2}$  to 5 grains).

## GOSSYPHII RADICIS CORTEX.

COTTON ROOT BARK.

*Synonym.*—Gossypii Cortex.

Cotton root bark is the dried root bark of *Gossypium herbaceum*, Linn. (N.O. Malvaceæ), a perennial plant indigenous to India, and cultivated there and in the United States, Egypt, etc.

The bark occurs in thin, tough, and fibrous strips to which long thin tapering rootlets are attached at intervals. Its outer surface is covered with a rough cinnamon-brown cork, which is easily separated, and exhibits a paler cortex beneath, while the inner surface is whitish, silky, and finely striated. The bast is laminated, the outer laminæ exhibiting, when separated, surfaces bearing minute brownish spots. Cotton root bark has no odour, but it possesses a somewhat acrid, astringent taste.

The chief constituent of the drug is a pale yellow or colourless acid resin, which is present to the extent of about 8 per cent., and becomes bright reddish-brown from absorption of oxygen. The bark also contains fixed oil, gum, sugar, tannin, and chlorophyll.

Cotton root bark has been used to produce abortion, and as a substitute for ergot in labour; in reality, it is quite devoid of action in the human subject. A tincture, liquid extract, and decoction are prepared; the last two are official for use in India and the Eastern, North American, and West Indian Colonies.

*NOTE.*—Gossypii Cortex, U.S.P., may be obtained from various cultivated species of *Gossypium*.

**GOSSYPIMUM.****COTTON.**

*Synonyms.*—*Gossypium Purificatum*; Purified Cotton;  
Absorbent Cotton; Cotton Wool.

Cotton consists of the hairs of the seeds of *Gossypium herbaceum*, Linn. (N.O. Malvaceæ), and other species of *Gossypium*. The plants are cultivated in tropical and sub-tropical countries. After removal from the seeds, the hairs are separated from impurities, and freed from fatty matter by boiling for half an hour with a 5 per cent. solution of potassium or sodium hydroxide. The cotton is then washed thoroughly with water, bleached by immersing in a 5 per cent. solution of chlorinated lime, again washed, and transferred to an acid bath. After further washing with water the bleached cotton is immersed in a weak alkaline bath for twenty minutes, again washed, dried, and the fibres mechanically loosened and separated in order to make a fleecy, absorbent "wool."

It occurs in soft, white filaments, from 2 to 5 centimetres long, each being a single hair from the seed. When examined under the microscope, the hairs appear as flattened twisted bands with slightly thickened edges. Cotton wool should be inodorous and tasteless, and readily absorb water, indicating absence of fatty matter, and should have neither an acid nor alkaline reaction. It is almost completely soluble in an ammoniacal solution of copper oxide, and burns easily, leaving less than 1 per cent. of ash.

Cotton chiefly consists of cellulose with traces of inorganic and proteid matter. Prepared as described above, it absorbs water readily and is peculiarly suitable for the preparation of surgical dressings, the best variety for that purpose occurring in long, soft, white filaments. Derivatives of cellulose prepared from cotton are dinitrocellulose (pyroxylin) and trinitrocellulose (gun-cotton). The latter substance, one of the most powerful explosives, is not soluble in a mixture of alcohol and ether.

Purified cotton is used largely as an absorbent or protective agent, and for applying various medicaments to the surface or cavities of the body. Used as a dressing to wounds, it takes up discharge, protects the part from external irritation and from cold, and excludes germs. For warmth, it is applied to the chest and back in sheets, and to gouty and rheumatic joints. The variously medicated antiseptic cotton wools are much used in surgery as dressings for operation wounds. They are distinctively coloured to facilitate identification. Discharges usually bleach the colouring matter, and thus become obvious. Cotton wool is also used to plug the orifices of sterilised vessels, bacteriological culture tubes, etc.

*NOTES.*—Absorbent gauze tissue, also known under the trade-name "Gamgee Tissue," consists of a thick layer of absorbent cotton, enclosed in absorbent gauze. It is used in large sheets as a protective, or absorbent of liquids (as in accouchement), or may be cut into pads and swabs of various sizes and shapes for use in surgery. A similar absorbent dressing is prepared from wood fibre. In loose pieces, it is styled, "Cellulose Wadding"; when prepared in sheets enclosed in absorbent gauze it is called "Cellulose Tissue."



**GOSSYPIUM ACIDI BORICI.****BORIC ACID WOOL.***Synonyms.*—Boracic Acid Wool; Boric Wool.

Boric Acid	...	...	...	...	50·00
Distilled Water, boiling...	...	a sufficient quantity			
Absorbent Cotton, in thin sheets	...	...	...	...	50·00

Prepare a hot saturated aqueous solution of the boric acid, and tint it with aniline red, immerse the cotton in the liquid, then remove the sheets to wire trays, and allow to drain and cool. The medicated cotton is afterwards pressed until it weighs 100, and then suspended until dry. The strength of the finished product varies, but the "wool" contains usually from 40 to 50 per cent. of boric acid. It should be preserved in well-closed cartons.

**GOSSYPIUM ACIDI SALICYLICI.****SALICYLIC ACID WOOL.***Synonym.*—Salicylic Wool.

Salicylic Acid	...	...	...	...	4·00
Alcohol	...	...	...	...	100·00
Absorbent Cotton	...	...	...	...	96·00

Dissolve the salicylic acid in the alcohol, and pour the solution over the cotton under pressure, so that the whole may be absorbed and diffused evenly throughout. Then dry the medicated cotton in thin layers, at a moderate temperature, and preserve the "wool," which contains 4 per cent. of salicylic acid, in well-closed vessels, protected from the light.

*NOTE.*—In order to prepare "wool" of 10 per cent. strength, use 10 of acid and 90 of cotton, instead of the quantities specified in the above formula.

**GOSSYPIUM CAPSICI.****CAPSICUM WOOL.**

Liquid Extract of Capsicum	...	...	...	...	10·00
Absorbent Cotton, in thin sheets	...	...	...	...	90·00
Alcohol	...	...	...	...	70·00

Dissolve the extract in the alcohol, and pour the solution over the cotton, under pressure, so that it may become saturated evenly with the liquid. After drying, keep the medicated cotton in well-closed cartons.

Capsicum wool is used as a rubefacient and counter-irritant. Thus, it is applied to the chest in bronchial inflammations, and to rheumatic joints. Its effect is increased by covering with oiled silk.

*NOTES.*—When freshly made, capsicum wool is of a pale orange colour, but it becomes bleached on keeping, though without loss of strength. In order to maintain an even colour it is advisable to dye the cotton with eosine, a reddish-brown powder, which dissolves in water to form a red liquid with a fine green fluorescence; the fluorescence is destroyed and the liquid turned yellow by hydrochloric acid.

**GOSSYPIUM CARBOLISATUM.****CARBOLISED WOOL.**

Carbolic Acid, in crystals	...	...	...	5'00
Methylated Ether (specific gravity, 0'720)	...	...	...	100'00
Absorbent Cotton	...	...	...	95'00

Dissolve the carbolic acid in the ether, and pour the solution over the cotton under pressure, so as to saturate it evenly. Then remove the medicated cotton, and open it into thin layers, so that the ether may evaporate quickly. When dry, preserve the "wool" in well-closed vessels.

NOTE.—This "wool" soon loses strength by exposure, and is only approximately of 5 per cent. strength when freshly made.

**GOSSYPIUM FERRI PERCHLORIDI.****FERRIC CHLORIDE WOOL.**

*Synonyms.*—Perchloride of Iron Wool; Styptic Wool.

Ferric Chloride...	...	...	...	15'00
Distilled Water...	...	...	...	100'00
Absorbent Cotton	...	...	...	85'00

Dissolve the ferric chloride in the water, saturate the cotton evenly with the solution, dry by exposure to the air, and preserve in well-closed cartons.

**GOSSYPIUM HAMAMELIS.****HAMAMELIS WOOL.**

Tincture of Hamamelis	...	...	...	250'00
Glycerin ...	...	...	...	15'00
Absorbent Cotton	...	...	...	75'00

Mix the glycerin with the tincture, saturate the cotton evenly with the mixture, dry by exposure to the air, and preserve in well-closed cartons.

**GOSSYPIUM HYDRARGYRI IODIDI.****MERCURIC IODIDE WOOL.**

*Synonyms.*—Biniodide of Mercury Wool; Red Iodide of Mercury Wool.

Mercuric Iodide	...	...	...	0'10
Potassium Iodide	...	...	...	0'10
Distilled Water...	...	...	...	100'00
Absorbent Cotton	...	...	...	100'00

Dissolve the salts in the water, diffuse the solution evenly through the cotton under pressure, dry the wool in a dark room, and preserve in well-closed vessels, protected from the light.

NOTE.—This "wool," the strength of which is 1 in 1000, is sometimes coloured pale red by adding a little eosine to the medicated solution (see Notes to Gossypium Capsici).

**GOSSYPIUM HYDRARGYRI PERCHLORIDI.****MERCURIC CHLORIDE WOOL.**

*Synonyms.*—Perchloride of Mercury Wool; Sublimate Wool.

Mercuric Chloride	...	...	...	...	0.50
Glycerin...	...	...	...	...	0.50
Distilled Water...	...	...	...	...	200.00
Absorbent Cotton	...	...	...	...	100.00

Dissolve the mercuric chloride in the glycerin and water, immerse the cotton in the solution, and press out the liquid until the medicated cotton weighs 200. Dry quickly in a dark room, and preserve the "wool" in well-closed vessels.

NOTE.—This "wool" soon deteriorates, the mercuric salt becoming reduced to the mercurous state in a few weeks.

**GOSSYPIUM IODISATUM.****IODISED WOOL.**

*Synonym.*—Iodine Wool.

Iodine	...	...	...	...	5.00
Potassium Iodide	...	...	...	...	5.00
Glycerin...	...	...	...	...	10.00
Methylated Ether (specific gravity, 0.720)	...	...	...	...	100.00
Absorbent Cotton	...	...	...	...	80.00

Dissolve the iodine and potassium iodide in the ether, add the glycerin, shake the liquids together, and saturate the cotton evenly under pressure. Then dry the medicated cotton quickly by exposure to the air, and preserve the "wool" in glass or earthenware vessels.

**GOSSYPIUM IODOFORMI.****ODOFORM WOOL.**

Iodoform	...	...	...	...	10.00
Methylated Ether (specific gravity, 0.720)	...	...	...	...	80.00
Absorbent Cotton	...	...	...	...	90.00

Dissolve the iodoform in the ether, and pour the solution over the cotton under pressure, so that it may become saturated evenly with the liquid. Then remove the medicated cotton, allow the ether to evaporate rapidly, and preserve the "wool" in well-closed vessels.

NOTES.—This "wool" is only approximately of 10 per cent. strength, as iodoform volatilises during the process (see note under *Carbasus Iodoformi*). A 50 per cent. iodoform wool is also prepared.

**GOSSYPIUM MENTHOLIS.****MENTHOL WOOL.**

Menthol	...	...	...	...	10.00
Liquid Paraffin	...	...	...	...	5.00
Purified Ether	...	...	...	...	250.00
Absorbent Cotton	...	...	...	...	85.00



Dissolve the menthol in the ether, add the liquid paraffin, shake thoroughly, and saturate the cotton evenly with the mixture. Finally, dry by exposure to the air, and preserve in well-closed vessels.

### GOSSYPIUM SAL ALEMBROTH.

#### SAL ALEMBROTH WOOL.

*Synonym.*—Blue Wool.

Alembroth Salt ...	...	...	...	...	4·00
Distilled Water...	...	...	...	...	200·00
Aniline Blue ...	...	...	a sufficient quantity		
Absorbent Cotton	...	...	...	...	98·00

Dissolve the salt and aniline blue in the water, immerse the cotton in this solution, then remove and press until it weighs 200. Finally, dry the "wool," which contains 2 per cent. of the alembroth salt, and preserve it in well-closed cartons.

### GRANATI CORTEX.

#### POMEGRANATE BARK.

*Synonym.*—Granatum.

Pomegranate bark is obtained from the stem and root of the pomegranate, *Punica Granatum*, Linn. (N.O. Lythrarieæ), a small tree cultivated in the countries bordering the Mediterranean.

The dried bark occurs in channelled or curved pieces varying usually from 5 to 10 centimetres in length and 1 to 3 centimetres in width. Its inner surface is smooth and yellowish, often exhibiting brown patches. The root bark has a rough outer surface of a dull earthy appearance, and often exhibits conchoidal depressions where portions of the outer layers have been separated by the formation of cork. Stem bark is usually in straighter and more regular pieces; the outer surface is smoother, exhibiting shallow, longitudinal, corky furrows, but only few conchoidal depressions; it also frequently bears the minute, dark apothecia of small lichens. Both root bark and stem bark have an astringent and slightly bitter taste. They break with a short granular fracture, the section exhibiting numerous fine tangential and radial lines.

The bark contains several alkaloids, the most important of which are pelletierine (punicine) and isopelletierine (isopunicine). Both are liquid at ordinary temperatures and volatile; pelletierine is brown in colour, and boils at 195°; isopelletierine closely resembles it. In addition to these alkaloids the bark also contains methyl-pelletierine (methyl-punicine), a liquid volatile alkaloid boiling at 215°, pseudopelletierine (pseudopunicine or granatonine), a crystalline alkaloid. The astringent taste is due to tannin, of which the bark contains about 22 per cent. The total alkaloid present varies usually in good samples from 0·5 to 1·0 per cent., stem bark being of about the same alkaloidal value as root bark. It yields

from 5 to 13 per cent. of ash, this wide range being probably partly due to earth adhering to the root bark.

Pomegranate bark is very astringent and unpleasant to the taste owing to the large quantity of tannin present. It is used solely to expel tape worm, either in the form of decoction, 60 mils (2 fluid ounces) every two hours for four doses, or as the alkaloid pelletierine and its tannate. Pomegranate bark is not purgative; its use as a vermifuge must therefore be preceded and followed by a brisk purge, such as castor oil. Poisonous symptoms from the absorption of pelletierine have occurred; they consist of giddiness, confusion of thought, and great muscular weakness.

*Dose.*—1 to 2 grammes (15 to 30 grains).

*NOTE.*—Most of the commercial drug consists of a mixture of stem and root barks, the former commonly predominating, but in view of the difference in alkaloidal value being small there appears no sufficient reason for separating them.

## GRANATI FRUCTI CORTEX.

### POMEGRANATE RIND.

Pomegranate rind is the pericarp of the fruit of *Punica Granatum*, Linn. (N.O. Lythrarieæ), a small tree cultivated in the countries bordering the Mediterranean. The fruit is globular, and crowned with a large tubular, five-toothed calyx, enclosing the remains of the style and stigma. Its pericarp is hard and granular, brownish-yellow or reddish in colour, and about 1.5 millimetres thick. The interior of the fruit is divided by membranous dissepiments into several cavities, each of which is filled with large triangular seeds.

The rind of the fruit, separated from the seeds and dried, constitutes the drug. It occurs in commerce in thin curved irregular pieces, granular and brownish-yellow in colour, and bearing on the inner surface the angular depressions made by the seeds. The fracture is short and granular, and the taste astringent.

Tannin is the chief constituent of the drug, and is present to the extent of 28 per cent.; it is said to be identical with gallotannic acid. The rind also contains a yellow colouring matter, but the alkaloids that characterise the bark of the root and stem have not been detected in it. It yields about 6 per cent. of ash.

Pomegranate rind is powerfully astringent. It is used in the form of decoction (1 in 20), dose, 15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce), in diarrhoea and dysentery, and as an injection in leucorrhœa.

*Dose.*—1 to 2 grammes (15 to 30 grains).

## GRINDELIA.

### GRINDELIA.

Grindelia consists of the dried leaves and flowering tops of *Grindelia camporum*, Greene, *G. robusta*, Nuttall, or *G. squarrosa*, Dunal (N.O. Compositæ), perennial herbs growing in the plains to

the south-west of the Rocky Mountains. The leaves and tops are collected when the plants are flowering and fruiting, and dried.

As seen in commerce the drug consists of the branching yellow upper portions of the stem bearing the capitula and a few leaves; as the latter readily break away from the stem the majority of them lie loose in the drug. The upper leaves, which are pale green, rigid, and brittle, attain a length of about 5 centimetres, and are sessile or amplexicaul; they vary in shape from spatulate to broadly oval, the margin being coarsely serrate, and the surface glabrous and minutely dotted. Surrounding the capitula are several rows of acute recurved bracts, and contain numerous compressed fruits, each of which is crowned by a pappus consisting of two stiff, thick bristles, and, when mature, is biauriculate or more rarely unidentate at the summit. The whole drug is remarkable for its extremely resinous nature, the resin being especially conspicuous in the capitula. It has a slight balsamic odour, and an aromatic bitter taste.

The chief constituent of the drug appears to be an amorphous resin, of which *grindelia* contains a considerable proportion; the resin is only partly soluble in benzene. Lævo-rotatory sugar, colouring matter, traces of volatile oil, etc., have also been found in the drug. Glucosides belonging to the class of saponins and an alkaloid have been said to be present, but later researches have not confirmed this assertion.

*Grindelia* is used in spasmodic asthma, whooping-cough, bronchitis, and hay fever. Its action resembles that of atropine, and probably depends upon depression of the vagal endings. It has been strongly recommended in cystitis and catarrh of the urinary passages. *Extractum Grindeliæ Liquidum* is the most suitable preparation for internal use. When diluted with water an addition should be made of 4 mils (1 fluid drachm) of mucilage of acacia to each 30 mils (1 fluid ounce) of mixture, to suspend the resins. The rather nauseous taste of *grindelia* may be masked with spirit of chloroform or glycerin. *Grindelia* is sometimes added to cigarettes for smoking in asthma. A solid extract is prepared for use in pill form.

NOTES.—The commercial drug is said to be obtained chiefly from *G. camporum*, Greene, a Californian species which closely resembles *G. robusta*. *G. squarrosa* is far more abundant than *G. robusta*, and said to be distinguished by the conical urceolate shape of the capitulum, which is longer than it is broad, that of *G. robusta* being depressed urceolate and broader than it is long, although this character is too variable to be definite. Other species of *Grindelia* have also been employed medicinally, but those specified are sufficiently distinguished by the glabrous surface and pappus consisting of two or three bristles. *Grindelia* is official in the Australasian and North American Colonies.

## GUAIACI LIGNUM.

### GUAIACUM WOOD.

*Guaiacum* wood is obtained from *Guaiacum officinale*, Linn., and *G. sanctum*, Linn. (N.O. *Zygophyllaceæ*), evergreen trees, the former



a native of the West Indian Islands and north coast of South America, the latter indigenous to South Florida and the Bahamas. The trees are felled, stripped of their bark, and cut into logs or billets for export.

The heart wood is dark greenish-brown in colour, dense, hard, and heavier than water. It has a slightly acrid taste, and when heated gives off an aromatic odour. A tincture of the heart wood gives a blue colour with diluted solution of ferric chloride due to the oxidation of the guaiaconic acid contained in the resin. The sap wood is much paler in colour than the heart wood, and should not be present in appreciable quantity.

The drug contains from 20 to 25 per cent. of resin, consisting of guaiaretic, guaiaconic, and guaiacic acids. To guaiaconic acid is due the blue colouration with oxidising agents (compare *Guaiaci Resina*). It also contains two bodies, guaiacsaponic acid and guaiacsaponin, belonging to the class of saponins, as well as a substance resembling gutta percha, termed guaiaguttin. It yields about 1.5 per cent. of ash.

*Guaiacum* wood is not much used in medicine, the resin being preferred.

### GUAIACI RESINA.

#### GUAIACUM RESIN.

*Synonyms.*—*Guaiacum*; *Guaiac*.

*Guaiacum* resin is obtained from the stem of *Guaiacum officinale*, Linn., or of *Guaiacum sanctum*, Linn. (N.O. Zygophyllaceæ). Most of the resin found in commerce is obtained by raising one end of a log of the wood and firing it; the heat melts the resin, which flows out of a hole or groove cut in the other end and is caught in pots herds or vessels. A small quantity is imported in large tears the size of walnuts or even larger.

The resin may occur in rounded or ovoid tears, or in large blocks, the latter being the usual form. It breaks easily with a clean glassy fracture, the thin pieces being transparent and exhibiting a colour varying from yellowish-green to reddish-brown. The powder is grey, but becomes green on exposure to light and air. It has a slightly acrid taste, and, when warmed, a balsamic odour. A solution in alcohol becomes deep blue on the addition of a diluted solution of ferric chloride, owing to oxidation of the resin.

The chief constituents of the resin are an amorphous resin acid, guaiaconic acid (about 70 per cent.), a crystalline resin acid, guaiaretic acid (about 10 per cent.), and guaiacic acid (about 10 per cent.). It also contains small quantities of gum, guaiac yellow, vanillin, volatile oil, guaiacsaponin, and guaiacsaponic acid. Guaiaconic acid is readily converted by oxidising agents (ferric chloride, ozone, hydrogen peroxide, chromic acid, etc.) into a deep blue substance termed guaiac blue.

*Guaiacum* resin is a mild purgative and diuretic. For its supposed action upon the mucous membranes of the throat, it is used in the form

of lozenge and pastille (see *Trochisci Guaiaci*). In acute tonsillitis it is given in powder form or as *Mistura Guaiaci*. Guaiacum is employed in chronic rheumatism and gout; it sometimes relieves the pain and inflammation, and if taken between the attacks may lessen the tendency to recurrence. It can be given in powder, cachets, or capsules. The ammoniated tincture of guaiacum is used in mixture form, and should be prescribed with mucilage of acacia (1 part in 8 parts of mixture) to suspend the resin. A simple tincture of guaiacum is employed principally as a test for blood with ozonic ether. Lozenges of guaiacum and sulphur are used in chronic rheumatism; *Confectio Guaiaci Composita* is a domestic remedy used for a similar purpose.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

NOTES.—Block guaiacum resin often contains considerable quantities of woody debris, etc. Good samples yield less than 8 per cent. of substances insoluble in alcohol, and less than 3 per cent. of ash. Tear resin yields about 2 per cent. of foreign substances and 1 per cent. of ash, and is therefore to be preferred to the block; but does not reach the market in sufficient quantity to supply the demand.

## GUAIACOL.

### GUAIACOL.



Guaiacol,  $\text{C}_6\text{H}_4\text{OCH}_3\text{OH}$ , may be obtained by the fractional distillation of wood creosote; it may also be produced synthetically, by heating a mixture of equimolecular proportions of pyrocatechin, potassium hydroxide, and potassium methylsulphate, in a closed vessel, at  $170^\circ$  to  $180^\circ$ .

It occurs as an oily, colourless liquid, having a penetrating, smoky odour, and a caustic taste. Slightly soluble in water (1 in 80); miscible with alcohol, ether, glycerin, and oils. Specific gravity about 1·143 (about 1·140 at  $25^\circ$ ). Boiling-point,  $200^\circ$  to  $202^\circ$ . With ferric chloride an aqueous solution is coloured a fugitive indigo blue, which changes to reddish-brown; an alcoholic solution assumes an emerald-green colouration, which passes to blue, and then brown. With sulphuric acid it assumes a persistent reddish-purple colour. Agitated with twice its volume of petroleum ether, if pure, the mixture rapidly and completely separates into two limpid layers; if impure a turbid mixture is formed. Heated with twice its volume of *Liquor Sodii Hydroxidi*, it yields on cooling a white crystalline mass. It leaves no residue on evaporation.

Guaiacol is an antiseptic and deodorant, used in place of creosote for internal administration in phthisis. It is better tolerated than creosote, but its action as an antiseptic is less powerful. It is commonly given dissolved in almond oil and enclosed in gelatin capsules, which may contain from 6 to 30 centimils (1 to 5 minims) or more in each. It may advantageously be given dissolved in cod-liver oil, either floating on water, as an emulsion, or in capsule form. Pills of guaiacol are prepared with soap and liquorice powder as

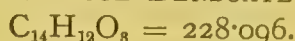
excipients in the same manner as creosote pills. Besides its antiseptic action on the alimentary canal guaiacol is also antipyretic, the temperature being lowered in the same way as by phenacetin or sodium salicylate. It is applied diluted with oil or hydrous wool fat (1 in 5 or 10) to the skin over rheumatic joints and in orchitis and neuralgia. Dissolved in olive oil (5 per cent.), it is used as an intra-laryngeal injection in phthisis, and as a hypodermic injection. The latter mode of administration is said, however, to have no advantage over the oral method, and may cause collapse. Guaiacol appears in the urine as sulphonate, but a small proportion is oxidised in the system. Many esters of guaiacol are employed in medicine; these generally pass through the stomach unchanged, but are broken up in the intestine with liberation of guaiacol.

*Dose.*— $\frac{1}{2}$  to 3 decimils (1 to 5 minims).

NOTES.—Pure crystallised guaiacol, the mono-methyl ester of ortho-dihydroxybenzene, occurs in colourless crystals. Slightly soluble in water (1 in 50); also soluble in alcohol, ether, and oils. Melting-point,  $31^{\circ}$  to  $32^{\circ}$ . Boiling-point,  $205^{\circ}$ .

## GUAIACOLIS BENZOAS.

GUAIACOL BENZOATE.



Guaiacol benzoate,  $\text{C}_6\text{H}_4\text{OCH}_3\text{OCOC}_6\text{H}_5$ , is the benzoyl ester of guaiacol.

It occurs as a white crystalline powder, with an aromatic taste and odour. Almost insoluble in water. Melting-point,  $50^{\circ}$  to  $52^{\circ}$ .

Guaiacol benzoate has been used as a non-irritating form in which to administer guaiacol for the diarrhoea of incipient phthisis, and in diabetes mellitus. It is best given in cachets.

*Dose.*—3 to 8 decigrams (5 to 12 grains).

NOTE.—Guaiacol benzoate is also known under the trade-name Benzosol.

## GUAIACOLIS CAMPHORAS.

GUAIACOL CAMPHORATE.



Guaiacol camphorate,  $(\text{C}_6\text{H}_4\text{OCH}_3\text{O})_2(\text{CO})_2\text{C}_{10}\text{H}_{18}$ , is a compound of guaiacol and camphoric acid, and may be obtained by the action of camphoric acid chloride on sodium guaiacol.

It occurs in colourless crystals or as a white powder, odourless and tasteless. Insoluble in water; soluble in alcohol and in chloroform.

Guaiacol camphorate has been used to check the night-sweats and diarrhoea of phthisis. It is best given in cachets.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTE.—Guaiacol camphorate is also known under the trade-name Guacamphol.



**GUAIACOLIS CARBONAS.**

GUAIACOL CARBONATE.



Guaiacol carbonate,  $(\text{C}_6\text{H}_4\text{OCH}_3)_2\text{CO}_3$ , is the carbonic ester of guaiacol, and may be obtained by slowly passing carbonyl chloride into guaiacol previously dissolved in sodium hydroxide solution, washing the precipitate and crystallising from alcohol.

It occurs as a white crystalline powder, almost without taste and odour. Slightly soluble in alcohol (1 in 70), insoluble in water. Melting-point about  $86^\circ$ . An alcoholic solution should not yield a bluish-green colour on the addition of solution of ferric chloride (absence of free guaiacol). The salt is decomposed by alcoholic potash, and guaiacol is liberated from the solution on addition of excess of acid.

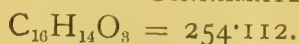
Guaiacol carbonate contains more than 90 per cent. of guaiacol, and is a non-irritating form in which to administer the drug in phthisis and typhoid fever. Its value as a drug depends upon its antiseptic action. It is partly absorbed, and its use in phthisis is due to the fact that it will, in large doses, convert a mixed infection into a simple tubercle. It is best given enclosed in a cachet. In rheumatoid arthritis good results have followed its use in combination with potassium iodide. Large doses of  $1\frac{1}{2}$  to 2 grammes (20 to 30 grains) have been given every two hours in pneumonia, but with doubtful benefit.

*Dose.*—3 to 10 decigrams (5 to 15 grains), which may be gradually increased to 2 grammes (30 grains).

*NOTE.*—Guaiacol carbonate is also known under the trade-name Duotal.

**GUAIACOLIS CINNAMAS.**

GUAIACOL CINNAMATE.



*Synonym.*—Cinnamyl-guaiacol.

Guaiacol cinnamate,  $\text{C}_6\text{H}_4\text{OCH}_3\text{OC}_9\text{H}_7\text{O}$ , is a compound of guaiacol and cinnamic acid, and may be prepared by mixing equal weights of guaiacol and cinnamyl chloride at ordinary temperature, and, after two hours, heating for some time on the water-bath; hydrochloric acid is formed along with guaiacol cinnamate. The salt is crystallised from boiling alcohol.

It occurs in colourless crystals or white granules, free from all odour and taste of guaiacol. Almost insoluble in water; soluble in alcohol, chloroform, and acetone. Melting-point,  $130^\circ$ .

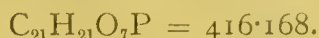
Guaiacol cinnamate has been used in intestinal phthisis, vesical catarrh, and typhoid fever, also in cystitis and gonorrhœa. It is best given in cachets.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

*NOTE.*—Guaiacol cinnamate is also known under the trade-name Styracol.

**GUAIACOLIS PHOSPHAS.**

GUAIACOL PHOSPHATE.



Guaiacol phosphate,  $(\text{C}_6\text{H}_4\cdot\text{OCH}_3)_3\text{PO}_4$ , is the phosphoric ester of guaiacol, prepared by the action of phosphorus oxychloride on guaiacol sodium.

It occurs as a white crystalline powder. Soluble in alcohol, chloroform, and acetone, insoluble in water. Melting-point,  $98^\circ$ .

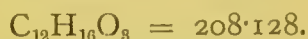
Guaiacol phosphate is used as a substitute for guaiacol in phthisis and typhoid fever. It is best given enclosed in a cachet.

*Dose.*—1 to 2 decigrams ( $1\frac{1}{2}$  to 3 grains).

NOTE.—Guaiacol phosphite (Guaiaco-Phosphal) is a white, crystalline powder, given in phthisis. Slightly soluble in water; more soluble in alcohol. Dose, 3 to 6 decigrams (5 to 10 grains).

**GUAIACOLIS VALERIANAS**

GUAIACOL VALERIANATE.



Guaiacol valerianate,  $\text{C}_6\text{H}_4\text{OCH}_3\text{OCOC}_4\text{H}_9$ , is a compound of guaiacol and valerianic acid obtained by the action of valeryl chloride on sodium guaiacol.

It occurs as a yellowish oily liquid having the characteristic odour of valerianic acid. Almost insoluble in water; soluble in alcohol, ether, benzene, and chloroform. Specific gravity, 1.037; boiling-point,  $245^\circ$  to  $265^\circ$ .

Guaiacol valerianate has been used in tuberculosis, bronchial affections, chlorosis, and diarrhœa.

*Dose.*—1 to 3 decimils (2 to 5 minims), in a gelatin capsule.

NOTE.—Guaiacol valerianate is also known under the trade-name Geosote.

**GUARANA.**

GUARANA.

Guarana consists of the prepared seeds of *Paullinia Cupana*, H. B. and K. (N.O. Sapindaceæ), a climbing shrub indigenous to Brazil and Uruguay. The seeds, collected when ripe, are washed and partially freed from their shells by beating, the kernels are then crushed, water is added to form a paste, which is shaped into cylindrical or globular masses, and dried in the sun, or by the heat of a slow fire. The dried product is called guarana.

It occurs in hard, heavy, more or less cylindrical pieces, from 10 to 30 centimetres long, and 25 to 40 millimetres thick. Externally it is of a dark, reddish-brown colour, and almost smooth; internally paler, and of a reddish colour, exhibiting pale fragments of the seeds embedded in a dark reddish mass.

The powder is of a light reddish-brown colour, and exhibits under the microscope numerous, rounded, parenchymatous cells, filled with

more or less gelatinised starch; fragments of the dark-brown epidermis of the seed, consisting of palisade cells, which in surface view have wavy outlines, may also be easily found. The inner portion of the seed-coat consists of parenchymatous cells, with beaded, or very coarsely pitted walls. Guarana has a slightly astringent and bitter taste, but no marked odour.

The chief constituent of the drug is 2·5 to 5 per cent. of caffeine. It also contains tannin, catechin, starch, and mucilage.

Guarana is used for the same purposes as caffeine; it has a reputation in sick headache, and is sometimes used as an astringent in diarrhœa and dysentery. The drug is used in powder form, being given in a cachet or mixed with water to form a draught. Elixir of guarana is a pleasant liquid form of the drug. Tincture of guarana is suitable for use in mixture form.

*Dose*.— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

## GUMMI INDICUM.

INDIAN GUM.

*Synonym*.—Ghatti Gum.

Indian or ghatti gum is an exudation from the wood of *Anogeissus latifolia*, Wall. (N.O. Combretaceæ), a large tree indigenous to India and Ceylon.

The gum occurs in vermiform or rounded tears, yellowish-white in colour, and transparent, but with a dull, rough surface. Its fracture is brittle, the fractured surface being glassy and free from cracks. Its odour is faint but characteristic, the taste bland and mucilaginous. The gum may be distinguished from gum arabic by the dull surface, uniform vitreous fracture, and by the frequently vermiform shape. It should be entirely soluble in water (forming a very viscous mucilage), but insoluble in alcohol; the aqueous solution is gelatinised by alcohol, and by saturated solution of borax, but is unaffected by ferric chloride or lead acetate. No blue colour should be obtained on adding iodine to the solution. With solution of lead subacetate a 10 per cent. solution of ghatti gum gives only a slight precipitate, solution of gum arabic giving a copious one. The gum should not yield more than 4 per cent. of ash on incineration.

The chief constituents of Indian gum are arabic acid and salts of arabic acid.

Indian gum has properties resembling those of gum arabic as a demulcent. It is an excellent emulsifying agent, and forms a nearly colourless mucilage with water.

*NOTE*.—Indian gum is sanctioned for use in India and the Eastern Colonies in making official preparations for which gum acacia is directed to be used, but only 1 part is used for every 2 parts of gum acacia ordered, as its viscosity is so much greater.



**GUTTÆ.****EYE DROPS.**

Eye drops are made by dissolving the required medicament in recently boiled and cooled distilled water, the strength being indicated in parts per 100 parts by volume. Such strengths may be taken as equivalent to percentages when the proportion of dissolved substance is small. It may be more accurately described as w/v (weight/volume) percentage, and corresponds to grammes per 100 mls; thus, a 1 per cent. weight/volume solution contains 1 gramme in 100 mls, and this is equivalent to 4.375 grains per fluid ounce. In making alkaloidal solutions in water, soluble salts are employed and not the free alkaloids, the latter being, for the most part, very sparingly soluble in water.

**Guttæ Atropinæ. ATROPINE EYE DROPS.**

Atropine Sulphate ... 0.25, 0.5 or 1.0 per cent.

Atropine dilates the pupil and paralyses accommodation.

**Guttæ Atropinæ et Cocainæ. ATROPINE AND COCAINE EYE DROPS.**

Atropine Sulphate ... 1.0 per cent.

Cocaine Hydrochloride ... 2.0 per cent.

**Guttæ Cocainæ. COCAINE EYE DROPS.**

Cocaine Hydrochloride ... 2.0 per cent.

Cocaine anæsthetises the superficial structures of the eye. It also dilates the pupil, constricts vessels (at first), and paralyses accommodation.

**Guttæ Cupri Sulphatis. COPPER SULPHATE EYE DROPS.**

Copper Sulphate... 0.5 per cent.

Copper sulphate is powerfully astringent to the conjunctival mucous membrane.

**Guttæ Daturinæ. DATURINE EYE DROPS.**

Daturine Sulphate ... 0.5 per cent.

The action of daturine resembles that of atropine.

**Guttæ Eserinæ. ESERINE EYE DROPS.**

See Guttæ Physostigminæ.

**Guttæ Eserinæ et Cocainæ. ESERINE AND COCAINE EYE DROPS.**

See Guttæ Physostigminæ et Cocainæ.

**Guttæ Homatropinæ. HOMATROPINE EYE DROPS.**

Homatropine Hydrobromide ... 1.0 per cent.

Homatropine dilates the pupil. Its action is more prompt and less prolonged than that of atropine.

**Guttæ Homatropinæ et Cocainæ. HOMATROPINE AND COCAINE EYE DROPS.**

Homatropine Hydrobromide ... 0.5 per cent.

Cocaine Hydrochloride ... 1.0 per cent.

**Guttæ Hyoscinæ.** HYOSCINE EYE DROPS.

Hyoscine Hydrobromide	...	0·5 or 1·0 per cent.
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This solution is used as a rapid and unirritating dilator of the pupil. It is more powerful than atropine.

**Guttæ Hyoscinæ et Cocainæ.** HYOSCINE AND COCAINE EYE DROPS.

Hyoscine Hydrobromide	...	0·5 per cent.
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Cocaine Hydrochloride	...	1·0 per cent.
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**Guttæ Physostigminæ.** PHYSOSTIGMINE (ESERINE) EYE DROPS.

Physostigmine Sulphate	...	0·5 or 1·0 per cent.
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Physostigmine contracts the pupil and reduces intra-ocular tension. It is antagonistic to atropine. Solutions of physostigmine tend to become pink owing to slow oxidation of the salt. They should be preserved in amber bottles and kept as much as possible from the air; the addition of boric acid largely prevents colouration.

**Guttæ Physostigminæ et Cocainæ.** PHYSOSTIGMINE (ESERINE) AND COCAINE EYE DROPS.

Physostigmine Sulphate	...	0·25 per cent.
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Cocaine Hydrochloride	...	1·0 per cent.
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**Guttæ Pilocarpinæ.** PILOCARPINE EYE DROPS.

Pilocarpine Nitrate	...	0·5 per cent.
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Pilocarpine contracts the pupil and diminishes intra-ocular pressure.

**Guttæ Zinci Chloridi et Cocainæ.** ZINC CHLORIDE AND COCAINE EYE DROPS.

Zinc Chloride	...	0·5 per cent.
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Cocaine Hydrochloride	...	0·25 per cent.
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Zinc chloride is powerfully astringent and antiseptic. It does not make a perfectly clear solution with water, but the filmy deposit is not of importance, and no attempt should be made to dissolve it by the addition of acid.

**GUTTA PERCHA.****GUTTA PERCHA.**

Gutta percha consists of the dried purified latex of various species of *Paladium* (*P. borneense*, Burck, *P. oblongifolium*, Burck, *P. Leerii*, Burck, etc.), large trees belonging to the natural order Sapotaceæ and indigenous to the Malay Archipelago. It is obtained by felling the trees, cutting transverse channels in the trunks, and allowing these channels to fill with latex, which is removed after it has coagulated, kneaded with water to remove impurities, and made into lumps; the product is subsequently boiled with water to free it further from impurities, and the softened mass formed into large flattened cakes. Attempts which have been made to obtain gutta

percha from the leaves, and thus avoid the destruction of the trees, have not yet been entirely successful; the latex can be obtained by incising the trunk of the living tree, but this method has not been generally adopted. Gutta percha is imported in blocks of variable but often considerable size, greyish-brown externally, reddish-grey and laminated or fibrous internally. They often contain impurities, which may be removed by mechanical means (straining whilst plastic, etc.).

The chief constituent of gutta percha is the hydrocarbon gutta, which is white when pure, and has been obtained in minute crystals. On exposure to the air it gradually assumes a reddish colour. From the crude drug alcohol extracts two series of substances classed as albans and as fluavils, all of which are crystalline. The former have been hydrolysed by alcoholic potash, yielding cinnamic acid and crystalline resinols. The fluavils also yield cinnamic acid and resinols. In addition to these substances, gutta-percha contains albanans, which differ from the albans in being less soluble in alcohol.

Gutta percha is entirely soluble in benzol, oil of turpentine, and carbon bisulphide, and almost entirely soluble in chloroform. Its chief use in pharmacy is for the preparation of traumaticin, a 10 per cent. solution of gutta percha in chloroform (see *Liquor Gutta Percha*), which is employed as a substitute for collodion, and with which chrysarobin, resorcin, and other medicaments may be incorporated for application to the skin. A more viscid solution (25 per cent.) is preferred by many dermatologists. Spread in thin sheets, as gutta percha tissue, it is used as a covering for moist dressings and poultices to delay evaporation or prevent soiling of linen. A prepared gutta percha is used as a stopping for decayed teeth.

### HÆMATOXYLI LIGNUM.

LOGWOOD.

*Synonym.*—Hæmatoxylon.

Logwood is the heartwood of *Hæmatoxylon campechianum*, Linn. (N.O. Leguminosæ), a tree indigenous to Central America, but naturalised in the West Indian Islands. The wood is exported in logs from which both the bark and sap wood have been removed. The logs are usually cut into chips, which are often moistened and exposed in large heaps, in which fermentation is allowed to take place. For medicinal use, however, the unfermented chips should be used.

The wood is hard, compact, and heavy, externally of a dull orange to purplish-red colour, internally reddish-brown. The chips or coarse particles have a slight, agreeable odour, and a sweet astringent taste, and colour dilute caustic alkalies pink. Fermented logwood chips are distinguished by their darker colour and the green lustre on portions of the surface.

The chief constituent of the unfermented drug is a colourless crystalline body hæmatoxylin, of which it contains about 10 per

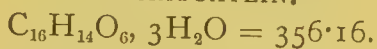


cent. Exposed to the air hæmatoxylin gradually acquires a reddish colour. Its solution in ammonia, which is bluish-violet in colour, absorbs oxygen from the air, and then contains hæmatein-ammonia, which can be obtained as a dark green mass with metallic lustre. It is this change that takes place during the fermentation of the chips. The drug also contains tannin, resin, and a trace of volatile oil.

Logwood is used as a mild astringent in diarrhœa, especially the diarrhœa of phthisis, in dysentery, and to arrest intestinal hæmorrhage. It is a useful astringent for children, with Mistura Cretæ or with bismuth. The decoction or the liquid extract may be used in mixture form; a solid extract is prepared for use in pills. The decoction is used as an injection in leucorrhœa. Preparations of logwood are incompatible with metallic salts, especially those of iron and mercury.

### HÆMATOXYLINUM.

#### HÆMATOXYLIN.



Hæmatoxylin,  $\text{C}_{16}\text{H}_{14}\text{O}_6, 3\text{H}_2\text{O}$ , may be obtained by mixing powdered extract of logwood with sand, repeatedly extracting the mixture with aqueous ether, recovering the latter, treating the syrupy residue with water, and crystallising, the crystals being washed with cold water, and finally recrystallised from boiling water containing a little sulphurous acid or soluble sulphite.

It occurs in the form of colourless or yellowish to yellowish-brown, glistening, transparent crystals, containing one molecule or three molecules of water of crystallisation, according to the conditions of crystallisation. It has a very sweet taste, but no astringency, and becomes red on exposure to the air. Sparingly soluble in cold water, freely soluble in hot water, alcohol, and ether. Soluble also in ammonia, the caustic alkalies and their carbonates with a purple colour. Its solution is dextrorotatory, reduces Fehling's solution and also silver nitrate. The ammoniacal solution absorbs oxygen from the air and forms hæmatein-ammonia, which, on the addition of acetic acid, deposits hæmatein,  $\text{C}_{16}\text{H}_{12}\text{O}_6$ , a blackish-violet crystalline powder, having the beetle-green metallic lustre seen on the surface of fermented logwood chips. This body may also be obtained by oxidising hæmatoxylin in ethereal solution by nitric acid. Reducing agents such as sulphurous acid reconvert it into hæmatoxylin. The aqueous solution of hæmatoxylin produces with solution of baryta, lead acetate, or copper sulphate white or greyish precipitates, which quickly become blue. Fused with potassium hydroxide, hæmatoxylin yields pyrogallol.

An alcoholic solution of hæmatoxylin (0·2 per cent.) is used as an indicator. It is yellow to orange in acid solution and purple in alkaline solution. Solutions of hæmatoxylin are much used in microscopy to stain tissues in sections or in bulk. Freshly prepared

solutions have no staining powers; on keeping, however, the hæmatoxylin is oxidised to hæmatein, which is the actual colouring agent. Hæmatoxylin solutions for this purpose are prepared with ammonia alum, which appears to hasten the process of "ripening." The tissues, after being stained red with hæmatoxylin, are washed in tap water, to change the colour to blue.

## HÆMOGLOBINUM.

### HÆMOGLOBIN.

*Synonyms.*—Oxyhæmoglobin; Hæmatocrystallin.

Hæmoglobin is the red colouring matter of the blood, and may be obtained by defibrinating blood, adding ten times its volume of 3 per cent. solution of sodium chloride, allowing the mixture to stand for a day or two for the red globules to subside, pouring off the clear liquid, and shaking the deposit with water and an equal volume of ether; the aqueous layer is separated and cooled in ice, a fourth of its volume of alcohol is added, and the mixture cooled to  $-5^{\circ}$ , when the hæmoglobin crystallises out. The product obtained by the process described or any similar process is in reality oxyhæmoglobin, which is the parent substance of hæmoglobin, and is the oxygen compound of the latter occurring in arterial blood.

It occurs generally in plates, prisms, or needles of the rhombic system, but it may also be obtained in scales, powder, or paste. Its crystalline form varies with the blood used for its preparation, the best for the purpose being that of dogs, rats, and guinea-pigs. The crystals are silky, doubly refractive, non-transparent, and possess a very marked pleochroism or play of colours. Hæmoglobin is decomposed by extremely small amounts of acid, coagulates at about  $64^{\circ}$ , and is dextro-rotatory, in this last respect differing from globin and all simple albumins. It does not give the characteristic albumin or iron reactions unless it is first decomposed. Oxyhæmoglobin is soluble in water, and may, like other similar substances, be distinguished by the absorption spectrum. On heating to  $60^{\circ}$  or  $70^{\circ}$  it splits up into albumin and hæmatin. If a solution of oxyhæmoglobin, mixed with a little sodium chloride, be evaporated over sulphuric acid to a syrup, mixed with fifteen times its volumes of glacial acetic acid, and heated on a water-bath for several hours, it yields, on cooling, flat rhombic crystals of hæmatin hydrochloride, with a dark violet-red colour and metallic lustre. The formation of these crystals is a means for the identification of blood stains. Hæmocyanin, an analogous substance, is a proteid in which the iron radical of hæmoglobin is replaced by copper; such a body occurs in the blood of cephalopods.

In venous blood, oxyhæmoglobin is reduced to hæmoglobin, and it is thus regarded as a carrier of oxygen. The oxygen compound is a very loose one. It readily parts with its oxygen *in vacuo*, especially when warmed, becoming thus converted into hæmoglobin. The oxygen compound is of a bright red colour, whilst hæmoglobin itself

is dark red, hence the difference between arterial and venous blood. Hæmoglobin is composed of a histone-like, basic, albuminous radical called globin, and a non-albuminous, acid radical called hæmatin. The average composition of oxyhæmoglobin is said to be represented by the formula  $C_{600}H_{960}N_{154}FeS_3O_{179}$  ( $=13341.3$ ). The sulphur is partly in the form of cystin in the globin, while the iron is contained in the hæmatin radical, and the ratio of the one to the other varies considerably in different animals. The hæmatin of all animals is alike, but not so the albuminous element.

Hæmoglobin is used as a substitute for the inorganic salts of iron in anæmia and chlorosis. It is converted into hæmatin in the stomach; whether the iron present in this substance is afterwards absorbed is doubtful, but, in any case, its use is greatly inferior to the inorganic iron salts. Many liquid preparations of hæmoglobin contain in addition the salts and alexines of the blood serum, to which tonic and nutritive properties have been ascribed. Hæmoglobin in scales, or powder, may be prescribed in cachets, 3 to 6 decigrams (5 to 10 grains) in each; hæmoglobin in paste may be enclosed in gelatin capsules, 6 to 20 decigrams (10 to 30 grains) in each, or made up into lozenges. Solutions of hæmoglobin in water require the addition of glycerin or spirit as a preservative. Derivatives of hæmoglobin are easily prepared by the action of heat, acids, alkalies, etc. Thus, hæmoglobol (Hæmol) and gallo-hæmoglobin (Hæmogallol) are obtained by reducing hæmoglobin with zinc dust and pyrogallol respectively. Hæmoglobol is a dark brown powder, slightly soluble in water; it is given in doses of 1 to 5 decigrams (2 to 8 grains) in cachets. Compounds of hæmoglobol with zinc (hæmozincum or zincohæmol), copper (hæmocuprum or cuprohæmol), iron (hæmoferrum or ferrohæmol), arsenic (hæmoarsenium or arsenhæmol), and bromine (hæmobrominum or bromohæmol) are also prepared. Gallohæmoglobin is a reddish-brown powder, slightly soluble in water. It is given in doses of 1 to 3 decigrams (2 to 5 grains) in cachets. Hæmoglobol and gallohæmoglobin are used in chlorosis and anæmia. Capsules containing hæmoglobin are largely used for their supposed effect in preventing the hair from turning grey or falling out.

*Dose*.—3 to 20 decigrams (5 to 30 grains).

## HAMAMELIDIS CORTEX.

HAMAMELIS BARK.

*Synonym*.—Witch Hazel Bark.

Hamamelis bark is obtained from *Hamamelis virginiana*, Linn. (N.O. Hamamelideæ), a shrub common in the United States and Canada. The bark should be collected in the spring, and dried.

It occurs in thin channelled or curved pieces, about 1.5 millimetres thick, and 0.5 to 2 decimetres long, sometimes covered with a smooth (or, in older pieces, scaly) grey cork marked



with transverse lenticels. The cork is often removed, and the cortex, which then forms the outer layer, is pale reddish-brown in colour and smooth. On its inner surface the bark is pale reddish-pink, and finely striated longitudinally, with small pieces of white wood occasionally adhering to it. The cork breaks with a short fracture, but the bast is fibrous. Though without odour, the bark has an astringent and slightly bitter taste. It yields on incineration about 5 per cent. of ash.

The bark contains about 6 per cent. of tannin, of which part is crystalline hamamelitannin, and part amorphous. Gallic acid, resin, fat, phytosterin, and other bodies are also present.

Hamamelis bark is a local astringent and hæmostatic. Diluted with 8 to 12 parts of water, the tincture is used as a lotion to small wounds, bruises and inflammatory swellings; it is also applied externally or injected into the rectum for piles. For the latter purpose suppositories are used containing 1 to 3 decigrams (2 to 5 grains) of hamamelin, often with opium or extract of belladonna. Tincture of hamamelis is given internally, quite irrationally, to check bleeding from the lungs or other organs. It has been pointed out already that the tannins which form the active constituent are changed into sodium gallate on reaching the blood. Sodium gallate has no astringent properties and none of the drugs which owe their action to tannin exert any remote astringent action.

*Dose.*—1 to 3 grammes (15 to 45 grains),

## HAMAMELIDIS FOLIA.

### HAMAMELIS LEAVES.

*Synonyms.*—Hamamelis; Witch Hazel Leaves.

Hamamelis leaves are obtained from *Hamamelis virginiana*, Linn. (N.O. Hamamelideæ). They are usually collected in the autumn, and may be used both fresh and dried.

The leaves are from 7 to 15 centimetres in length, dark green or brownish-green on the upper surface, paler on the under surface, with an obtuse apex and a sinuate margin. They have a pinnate venation, the veins being more prominent on the under surface, and bearing branching hairs, especially when young. The odour of the leaves is slight, the taste bitter and astringent.

The leaves contain tannin, gallic acid, a bitter principle, and a trace of volatile oil. They yield about 5 per cent. of ash.

Hamamelis leaves have properties similar to those of the bark. The liquid extract, diluted with 20 to 30 parts of water, is used as a local astringent and was formerly given internally to arrest hæmorrhage. Distilled extract of hamamelis is used as a mild astringent for wounds and abrasions, and as a lotion for piles.

*Dose.*—1 to 3 grammes (15 to 45 grains).

NOTE.—Hamamelis bark and leaves are understood to form the basis of proprietary preparations resembling Liqueur Hamamelidis.

**HAMAMELINUM.**

HAMAMELIN.

*Synonym.*—Hamamelidin.

Hamamelin is prepared from the bark or leaves of *Hamamelis virginiana*, Linn. (N.O. Hamamelideæ).

It occurs as brownish powder, which is more or less hygroscopic. The leaves are said to yield about 7 per cent. of a dark-brown extractive to strong alcohol. The bark, by similar treatment, yields about 16 per cent. of a light-brown extract more easily reducible to powder than the former. The leaf extract is said to be more effective than that of the bark.

Hamamelin is used in the form of suppository for piles, 1 to 3 decigrams (2 to 5 grains) in each, prepared with cacao butter. It may be combined with cocaine, orthocaine, extract of belladonna, or bismuth subgallate, as desired. It is used internally in a similar manner to Extractum Hamamelidis.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**HELLEBORI NIGRI RHIZOMA.**

BLACK HELLEBORE RHIZOME.

Black hellebore rhizome is the product of the Christmas rose, *Helleborus niger*, Linn. (N.O. Ranunculaceæ), an herbaceous plant with perennial rhizome, cultivated in this country, but growing wild in abundance on the lower alps of Central Europe. The commercial drug is usually deprived of its roots ("trimmed"), but it occasionally occurs with the roots attached ("with fibre").

The rhizome is small, black, and tortuous, varying from about 2 to 5 centimetres in length, and averaging about 5 millimetres in thickness. It produces numerous short erect branches, which bear amplexicaul leaf scars, and are terminated with the scars of the aerial stems. Its under surface bears numerous root scars, or, if the rhizome has not been trimmed, long, black rather stout roots. The rhizome breaks with a short fracture, and exhibits a small pith surrounded by comparatively large wedge-shaped, radially elongated wood bundles. It has only a slight odour, but a bitter, acrid taste. Powdered hellebore has a powerful sternutatory action.

The drug contains two crystalline toxic glucosides, helleborin and helleborein, the former being a narcotic, and the latter a cardiac poison, similar in its action to digitalis, and a drastic purgative. The rhizome is free from tannin.

Black hellebore is a powerful hydragogue cathartic and emmenagogue. It is poisonous in large doses, producing violent inflammation of the gastric and intestinal mucous membranes. It was formerly much employed in amenorrhœa and dropsy, but has now almost fallen into disuse. Applied locally the fresh root is violently irritant. For internal use a tincture is prepared or a decoction may be made (1 in 80).

NOTES.—Other species of *Helleborus* yielding rhizomes resembling that of *H. niger* are *H. viridis*, Linn., the green hellebore, and *H. foetidus*, Linn., the fetid hellebore. The former may be distinguished by its large pith and tangentially extended wood bundles; in the rhizome of *H. foetidus* the wood is radiate and is more strongly developed, there being little or no pith. The rhizome of *Cimicifuga racemosa*, Nutt., is much larger, the branches are longer, and curve upwards, and the drug contains tannin. White hellebore is the rhizome of *Veratrum album*, Linn.

## HEMIDESMI RADIX.

HEMIDESMUS ROOT.

*Synonym.*—Indian Sarsaparilla.

Hemidesmus root is the product of *Hemidesmus indicus*, R.Br (N.O. Asclepiadeæ), a climbing plant indigenous to India and Ceylon.

The root is tortuous, rigid, shrunken and simple or only slightly branching, 30 centimetres or more in length, and from 3 to 6 millimetres in thickness. It varies in colour from dull red to dark brown, bears but few wiry rootlets, and is marked at frequent intervals with cracks that penetrate the cork and occasionally the cortex. The cork, which is very thin, easily separates from the cortex, and is in places detached from it. The aerial stems which are attached to the crown of the root are slender and exhibit alternate leaf scars. The odour recalls that of tonka bean; the taste is aromatic and sweetish.

The constituents of hemidesmus root are unknown. The aromatic odour is supposed to be due to coumarin, or an allied substance.

Hemidesmus root is used in India as an antisymphilitic in place of sarsaparilla. It was formerly applied to similar uses in this country, but now survives only as the syrup, and is used principally as a flavouring agent. A decoction may be prepared (1 in 10), and is given in doses of 60 mils (2 fluid ounces), several times daily.

## HIRUDO.

LEECHES.

Leeches are fresh-water annelids, the speckled leech, *Sanguisuga medicinalis*, Savigny, and the green leech, *Sanguisuga officinalis*, Savigny (Order Hirudinea), being obtained chiefly from Germany (near Hanover) and the South of France.

They have a soft, smooth body, about 5 centimetres in length, tapering towards the extremities, both of which are provided with disc-shaped suckers. The anterior sucker is the smaller, and surrounds the tri-radiate jaws, by which the leech effects an incision in the skin. The dorsal surface is olive-green, with six rusty-red longitudinal lines; the ventral surface of the speckled leech is greenish-yellow, with black spots, that of the green leech being olive-green, with a black line.



The buccal secretion of leeches contains a substance named hirudin, which retards the coagulation of blood. It is extracted by treating the minced heads of leeches with physiological salt solution, at a temperature of  $38^{\circ}$  to  $40^{\circ}$ , and can be obtained in brownish lamellæ or light masses. It is readily soluble in water, but insoluble in alcohol or ether.

Leeches are used to reduce congestion and inflammation in such conditions as pleurisy, pneumonia, ophthalmia, pericarditis, inflammation of the ear, liver, etc. Each leech draws on an average about 6 mils (90 minims) of blood. The blood drawn does not coagulate, owing to its admixture with the pharyngeal or buccal secretion of the leech, which checks its coagulability. This secretion is also injected into the place bitten, and is in some degree the cause of the persistent hæmorrhage that often follows removal of the leech, as well as of the apparent bruising round the site of the puncture. If desired, the bleeding may be encouraged to persist by hot fomentations or poultices. The hæmorrhage may usually be arrested by the pressure of a pad of cotton-wool, fixed by a bandage; or a solution of perchloride of iron on cotton-wool may be used as a styptic. Leeches are usually applied with a leech glass; or a hole may be cut in a piece of blotting-paper, and the leech confined to its position by a pill-box or tumbler. The skin should be cleansed and moistened with sweetened milk at the site of application. If hirudin be injected into the general circulation the blood drawn off takes several hours to clot. It has, therefore, been suggested that this substance should be given to those suffering from thrombosis, and in other conditions in which the blood is apt to clot too readily.

### HIRUDO AUSTRALIS.

#### AUSTRALIAN LEECHES.

Australian or five-striped leeches, *Hirudo quinquestriata*, Schmarda (Order Hirudinea), are found in the Australasian Colonies, where they are used instead of the European varieties.

They are greenish-yellow on the ventral surface, and yellowish-brown on the dorsal surface, which is also marked with five longitudinal stripes. The jaws are large and contain forty-eight to fifty teeth, the inner ones being the larger.

Australian leeches are used in a similar way to European leeches, and for the same purposes (see *Hirudo*).

NOTE.—Australian leeches are also known as *Hirudo Australis*, Bosisto, or *Limnobdella quinquestriata*, R. Blanch.

### HOMATROPINÆ HYDROBROMIDUM.

#### HOMATROPINE HYDROBROMIDE.



*Synonym.*—Hydrobromate of Homatropine.

Homatropine hydrobromide,  $\text{C}_{16}\text{H}_{21}\text{NO}_3\text{HBr}$ , is a salt of an alkaloid prepared by heating on a water-bath for several days a

strong solution of tropine mandelate with diluted hydrochloric acid; the homatropine hydrochloride produced is decomposed by means of an alkaline solution, shaken out with chloroform, the chloroform distilled off, and the residue treated with diluted hydrobromic acid, the homatropine hydrobromide thus formed being crystallised, and further purified by recrystallisation from alcohol.

It occurs in the form of a white, odourless, crystalline powder, which is neutral to litmus. Soluble in water (1 in 6) and alcohol (1 in 18), slightly soluble in absolute alcohol (1 in 133), insoluble in ether, and almost insoluble in chloroform. Melting-point,  $210^{\circ}$  to  $212^{\circ}$  (U.S.P.,  $213.8^{\circ}$ ). When precipitated by an alkali, and crystallised from ether, the alkaloid should melt at  $96^{\circ}$ . It should leave no residue on ignition, and should dissolve in cold concentrated sulphuric acid without colour. The official mercuric chloride test distinguishes it from almost every alkaloid except atropine and hyoscyamine, the fuming nitric acid test distinguishes it from those two bases, and from hyoscyne, and the ammonia test also distinguishes it from atropine.

Homatropine hydrobromide is used to dilate the pupil of the eye. Its action is quicker in onset, and much less prolonged than that of atropine; the addition of cocaine enhances its rapidity of action and increases the degree of mydriasis. Homatropine hydrobromide is rarely used internally; it resembles atropine in its action, but is less powerful. Guttæ Homatropinæ contain 1 per cent. of the salt, and Guttæ Homatropinæ cum Cocaina 2 per cent. of cocaine in addition. Ophthalmic discs are prepared, containing 0.65 milligram ( $\frac{1}{100}$  grain) of homatropine hydrobromide in each, with or without cocaine. Pure homatropine is used as an ointment (1 in 100 of soft paraffin), or as Oleum Homatropinæ, a 2 per cent. solution in castor oil. The latter causes a little irritation, but is not so readily washed away by tears. In cases of poisoning by homatropine or its salts, emetics should be given, the stomach-pump and artificial respiration employed, and antidotes, such as pilocarpine (hypodermically), tannic acid, or strong tea administered.

*Dose.*— $\frac{3}{4}$  to 3 milligrams ( $\frac{1}{80}$  to  $\frac{1}{20}$  grain).

NOTES.—Other synthetic substitutes for atropine include methyl-atropine and euphthalmine. Methyl-atropine nitrate (Eumydrin) and hydrobromide (Mydriastine) are used in 1 or 2 per cent. solutions; mydriasis is rapidly produced, and is not so prolonged as with atropine. In the case of euphthalmine, 2 to 10 per cent. solutions are used; the accommodation is not much affected, and the mydriasis passes off quickly.

## HORDEUM DECORTICATUM.

### PEARL BARLEY.

Pearl barley is the dried fruit of *Hordeum distichon*, Linn. (N.O. Graminaceæ), from which the integuments and outer portions of the kernel have been more or less completely removed.

The prepared fruits are white in colour, with a farinaceous taste and odour, from 2.5 to 4 millimetres long, and from 1.5 to 4 milli-

metres broad. Each one bears a trace of the longitudinal furrow, in which remains of the brownish integuments are visible. The starch granules closely resemble those of wheat, but the large grains are rather smaller and less regularly circular, with a tendency towards a subreniform shape.

Barley contains from 60 to 68 per cent. of starch, and from 12 to 16 per cent. of proteids, cellulose, etc.

Pearl barley is used for the preparation of a decoction (see Decoctum Hordei), which is a nutritive and demulcent drink in febrile conditions and in catarrhal affections of the respiratory and urinary systems. This decoction, or barley water, is also used as a diluent of cow's milk for young infants; it prevents the formation of hard masses of curd in the stomach, the casein being precipitated in a more readily digestible form as a fine flocculence. The "patent" barleys largely sold as a substitute for pearl barley are in fine powder, but have properties similar to those of pearl barley.

### HYDRARGYRI CYANIDUM.

MERCURIC CYANIDE.



*Synonym.*—Mercury Cyanide.

Mercuric cyanide,  $\text{Hg}(\text{CN})_2$ , may be prepared by boiling finely powdered Prussian blue and mercuric oxide in water until the mixture has become brown, when it is filtered, acidified with hydrocyanic acid, evaporated, and allowed to crystallise in a cool, dark place; or by the action of hydrocyanic acid on mercuric oxide, keeping the former in slight excess.

It occurs in colourless, transparent, or white prismatic crystals, anhydrous, odourless, of a nauseating metallic taste, and poisonous. Soluble in cold water (1 in 13); in boiling water (1 in 3); in alcohol (1 in 20); in glycerin (1 in 4); sparingly soluble in ether. It is not decomposed by alkalis; diluted hydrochloric acid, however, decomposes it with evolution of hydrocyanic acid. On heating, it decrepitates and decomposes into mercury and cyanogen, further heating wholly dissipating it. A 5 per cent. aqueous solution should be neutral to litmus and should not yield, on the gradual addition of a few drops of solution of potassium iodide, a red precipitate soluble in excess of the precipitant, nor a white precipitate with solution of silver nitrate (absence of mercuric chloride).

Mercuric cyanide is a powerful antiseptic, having the general properties of mercuric salts (see Hydrargyri Perchloridum). It is used as a paint to syphilitic sores (1 to 2 per cent.), especially of the tongue and throat, but is extremely poisonous and must be used with caution. Solutions (1 in 2000 to 1 in 4000) are used as an antiseptic eye lotion. A solution of 1 in 500 has been employed in "ophthalmia neonatorum," and 1 in 1000 in ordinary ophthalmia. It is given internally in syphilis, in doses of  $\frac{1}{8}$  grain, usually in pill form, the salt being carefully triturated with milk sugar and massed



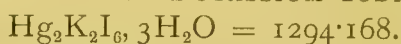
with a very small quantity of glycerin of tragacanth. A 1 per cent. solution may be injected intravenously, or deeply into muscular tissue, in doses of 12 decimils (20 minims), cocaine being added to the solution if necessary.

*Dose.*—4 to 8 milligrams ( $\frac{1}{16}$  to  $\frac{1}{8}$  grain).

*Notes.*—A double cyanide of mercury and zinc is prepared to medicate antiseptic dressings (see Hydrargyri et Zinci Cyanidum). Mercuric oxycyanide is a compound of mercuric cyanide with mercuric oxide; it is soluble in water, and is used as an antiseptic paint or lotion (0.2 to 0.6 per cent.) in place of mercuric cyanide or mercuric chloride.

## HYDRARGYRI ET POTASSII IODIDUM.

MERCURY AND POTASSIUM IODIDE.



*Synonyms.*—Iodo-hydrargyrate of Potassium; Potassio-mercuric Iodide; Potassium Mercurio-iodide.

Mercury and potassium iodide,  $(\text{HgI}_2\text{KI})_2, 3\text{H}_2\text{O}$ , may be prepared by boiling together mercuric iodide, potassium iodide, and water in equal quantities. The solution obtained may be crystallised by evaporating or cooling. It may also be obtained by boiling a solution of potassium iodide with mercuric oxide.

It occurs in the form of long yellow prisms, which are deliquescent. Soluble in water, alcohol, ether, and in concentrated acetic acid, but decomposed by other acids with separation of mercuric iodide. The aqueous solution mixed with potassium hydroxide forms a solution resembling that of Nessler. On heating, the crystals first give off water and then melt to a red liquid, from which mercuric iodide separates.

This compound has similar properties to mercuric iodide. The double salt in solid form is not much used, as its solutions are more commonly prepared by precipitating an aqueous solution of mercuric chloride with potassium iodide (see Hydrargyri Iodidum Rubrum).

*Dose.*—2 to 4 milligrams ( $\frac{1}{32}$  to  $\frac{1}{16}$  grain).

*NOTE.*—Nessler's reagent may be prepared as follows:—Dissolve  $3\frac{1}{2}$  of potassium iodide, and  $1\frac{1}{4}$  of mercuric chloride, in 80 of distilled water, and add a cold saturated aqueous solution of mercuric chloride, with constant stirring, until a slight red precipitate remains; then dissolve sodium hydroxide, 12, in the liquid, add a little more of the aqueous solution of mercuric chloride, and make up to 100 with distilled water.

## HYDRARGYRI ET ZINCI CYANIDUM.

MERCURY AND ZINC CYANIDE.

*Synonyms.*—Zinc and Mercury Cyanide; Lister's Salt.

Mercury and zinc cyanide was at one time thought to be a definite compound of the formula  $\text{HgZn}(\text{CN})_4$ , but later the formula  $\text{Zn}_4\text{Hg}(\text{CN})_{10}$  was suggested, and it is now regarded as merely an intimate mixture of the cyanides, or at best a very indefinite

molecular combination. It may be prepared by mixing cold solutions of equimolecular quantities of zinc-potassium cyanide and mercuric chloride, or of mercuric potassium cyanide and zinc sulphate, washing the precipitate with cold water until the washings are nearly free from mercury, and drying by exposure to the air, or preferably in a cold desiccator. By the use of saturated solutions of the reacting salts in equimolecular proportions a product containing a maximum of about 38 per cent. of mercuric cyanide is obtained; the use of weaker solutions, or of the salts in any proportion other than equimolecular, results in a product weaker in mercuric cyanide. Commercial specimens usually contain between 20 and 25 per cent. of mercuric cyanide, and a minimum standard of 20 per cent. might reasonably be suggested.

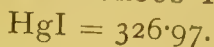
It occurs as a white, inodorous, amorphous powder, insoluble in water, soluble in diluted acids. The cyanogen radical may be determined by distilling with diluted sulphuric acid into a solution of silver nitrate, collecting, drying, and weighing the resulting silver cyanide. The mercury may be precipitated from the residue by warming with hydrochloric and hypophosphorous acids, and weighed in the metallic state after cohesion into one globule.

Mercury and zinc cyanide is a powerful germicide and antiseptic, especially suitable for use in the medication of gauze, wool, lint, etc., as it is not reduced by contact with the organic material of which the dressing is composed. A paste with a tragacanth base, containing 33 per cent. of the double cyanide has been recommended for use in war as a temporary dressing for wounds. Lotions (1 in 5000 to 1 in 1000) and gargles (1 in 8000) are used as antiseptic solutions and in syphilitic sore throat. An ointment (1 per cent. in soft paraffin) is used for syphilitic sores. For these preparations the untinted salt must be used.

NOTES.—Mercury and zinc cyanide is frequently coloured with a minute proportion (1 in 50000) of aniline violet. Gauze, lint, and wool impregnated with the double cyanide substance are used as antiseptic dressings, and may be distinguished by their violet colour.

## HYDRARGYRI IODIDUM FLAVUM.

YELLOW MERCUROUS IODIDE.



*Synonym.*—Yellow Iodide of Mercury.

Yellow mercurous iodide,  $\text{HgI}$ , may be prepared by adding to a solution of mercurous nitrate slowly, and with constant stirring, a solution of potassium iodide, collecting the precipitate, and washing by decantation until the washings no longer give an acid reaction with litmus paper. The precipitate is then dried between sheets of bibulous paper in a dark place at a temperature not exceeding  $40^{\circ}$ . It should contain about 99.5 per cent. of pure mercurous iodide.

It occurs as a bright yellow, heavy powder, odourless and tasteless. Exposure to light darkens the colour by causing decomposition into metallic mercury and mercuric iodide. It is

almost insoluble in water, quite insoluble in alcohol and ether. Hydrochloric acid and sulphuric acid affect it only slightly. Strong nitric acid converts it into a white crystalline double salt of mercuric iodide and nitrate. When heated to about  $70^{\circ}$  it becomes red, assuming its original yellow colour on cooling. With strong heating it volatilises, giving off dark violet vapours. In contact with solution of potassium iodide the salt is converted into mercuric iodide, which dissolves, leaving a residue of metallic mercury. If 0.5 gramme of the salt be shaken with 10 mls of alcohol and filtered a portion of the filtrate should not be darkened by hydrogen sulphide, nor should it produce more than a faint transient opalescence on dropping into water (absence of more than traces of mercuric iodide).

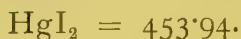
Yellow mercurous iodide is sometimes used in syphilis, especially in the more advanced stages, with the idea of combining the mercurial and iodide action in one salt. The amount of iodide ion, however, which can be administered in this way is quite inadequate. It is best given in pills, the salt being rubbed with sugar of milk and massed with glycerin of tragacanth or syrup of glucose. An ointment (1 in 8 of lard) is prepared for application to enlarged glands and for use in chronic skin diseases. It must not be prescribed with soluble iodides or chlorides, owing to its tendency to form mercuric iodide.

*Dose.*—8 to 16 milligrams ( $\frac{1}{8}$  to  $\frac{1}{4}$  grain).

*NOTE.*—Yellow mercurous iodide should be stored in dark amber or black bottles.

## HYDRARGYRI IODIDUM RUBRUM.

MERCURIC IODIDE.



*Synonyms.*—Red Mercuric Iodide; Biniodide of Mercury; Red Iodide of Mercury.

Mercuric iodide,  $\text{HgI}_2$ , may be prepared by precipitating a solution of 40 of mercuric chloride in 800 of water with 50 of potassium iodide, also dissolved in 800 of water. It should contain about 99 per cent. of mercuric iodide.

It occurs as a bright, scarlet-red powder, almost insoluble in water, very slightly soluble in alcohol (1 in 300), readily in ether, and in solution of potassium iodide or mercuric chloride, also soluble in castor oil (1 in 50), and olive oil (1 in 280). On heating to about  $150^{\circ}$  it becomes yellow, and red again on cooling; at a higher temperature it first fuses and then volatilises, leaving not more than a trace of residue. It should be entirely soluble in ether (absence of mercurous iodide).

Mercuric iodide is more powerfully antiseptic than mercuric chloride, and not so irritating, as it combines less readily with albumen. It is rendered soluble by four-fifths its weight of potassium iodide. Solutions so prepared are much used in surgical practice—aqueous solutions (1 in 2000 to 5000) for application to wounds, and spirituous solutions (1 in 500 to 1 in 2000) for rendering



the skin and hands aseptic. Liquid and solid soaps are similarly medicated. Tablets for the extemporaneous preparation of solutions of mercuric iodide are prepared; they contain mercuric iodide with a sufficiency of potassium iodide to form a clear solution. It is given internally in syphilis, in solution with iodide of potassium, as *Liquor Arsenii et Hydrargyri Iodidi*, or in pills. The latter should be prepared by triturating the mercuric salt with sugar of milk and massing with a minimum of glycerin of tragacanth. Mercuric iodide is administered by intramuscular injection in solution with sodium iodide, 1 per cent. of each being taken; dose, 5 decimils (8 minims), but it causes some pain: it is often prescribed in syphilis between the secondary and tertiary symptoms. Externally, it is a powerful local irritant. The ointment is applied in goitre and for bronchocele; in veterinary practice a strong ointment (1 to 4) is used to produce vesication.

*Dose*.—2 to 4 milligrams ( $\frac{1}{32}$  to  $\frac{1}{16}$  grain).

NOTE.—Mayer's reagent, used as a test for alkaloids, may be prepared as follows:—Dissolve mercuric chloride, 1.344, in distilled water, 60, and potassium iodide, 5, in distilled water, 10; mix the two solutions, and add sufficient distilled water to produce 100.

## HYDRARGYRI IODIDUM VIRIDE.

GREEN MERCUROUS IODIDE.

$\text{HgI} = 326.97$ .

*Synonym*.—Green Iodide of Mercury.

Green iodide of mercury,  $\text{HgI}$ , may be prepared by triturating 40 of mercury with 2 or 3 of alcohol, and gradually adding 25.5 of iodine, in small quantities at a time. The trituration should be continued until globules of mercury are no longer visible and the powder is of a uniform greenish-yellow colour. Another method is to shake the mercury vigorously with three times its volume of chloroform, and add to the mercury thus finely divided, in a constant stream, the powdered iodine, triturated with a large quantity of chloroform. The reaction begins at once, and the greenish-yellow iodide which settles to the bottom is collected, washed with boiling alcohol, and dried in the dark at about  $30^{\circ}$ .

It occurs as a greenish-yellow, odourless, and tasteless powder. The greenish colour is due to the blue of free mercury blending with the yellow of true mercurous iodide,  $\text{Hg}_2\text{I}_2$ . Insoluble in cold water, cold alcohol, and ether. On strongly heating it melts to a brown liquid and then volatilises completely. It is decomposed by exposure to light into mercuric iodide and metallic mercury; by chlorine into mercuric chloride and mercuric iodide; by nitric acid into mercuric nitrate and mercuric iodide; by soluble iodides into mercuric iodide and metallic mercury. It should contain a slight excess of mercury.

Green mercurous iodide was formerly official. It contains excess of mercury and is less potent than the yellow iodide.

*Dose*.—10 to 60 milligrams ( $\frac{1}{8}$  to 1 grain).

**HYDRARGYRI OLEAS.****MERCURIC OLEATE.**

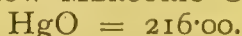
*Synonyms.*—Precipitated Mercuric Oleate; Mercury Oleate.

Mercuric oleate is prepared by the following process:—Rub together 4 of oleic acid and 64 of hard soap in powder, dissolve the mixture in 352 of distilled water, and add 32 of mercuric chloride, previously dissolved in 320 of distilled water. Boil the mixed solutions for ten minutes, then set aside for the mercuric oleate to settle, remove the supernatant liquid by decantation, wash the precipitated oleate with hot water until nearly free from chlorides, and dry on a water-bath.

It occurs as a light greyish-yellow, unctuous mass, with a soap-like odour. It tends to darken on keeping.

This preparation is used almost entirely in the form of Unguentum Hydrargyri Oleatis, for application to syphilitic lesions, the destruction of pediculi, and as a stimulating antiseptic in some forms of eczema. Oleinatum Hydrargyri is preferred by many practitioners, especially for application to ringworm, enlarged glands, and inflamed joints, and for inunction.

**NOTE.**—In making mercuric oleate, contact with metallic utensils must be avoided, and the product should be preserved in well-closed vessels.

**HYDRARGYRI OXIDUM FLAVUM.****YELLOW MERCURIC OXIDE.**

*Synonym.*—Yellow Oxide of Mercury.

Yellow mercuric oxide,  $\text{HgO}$ , may be obtained by mixing solutions of mercuric chloride and sodium hydroxide, collecting the precipitate, washing, and drying at a temperature not above  $30^{\circ}$ .

It occurs as a yellow powder, insoluble in water, soluble in hydrochloric acid. When moistened with hot water it should be neutral to litmus, and on ignition should leave only a trace of residue. When determined gravimetrically, between 92 and 92.5 per cent. of metallic mercury should be obtained, corresponding to 99.3 per cent. of mercuric oxide. It should not contain more than traces of iron and sulphates, and should be free from chlorides.

Yellow mercuric oxide is an antiseptic and escharotic, and is used principally in the form of ointment, in syphilitic eruptions, chronic eczema, pityriasis, and other skin affections. When taken by the mouth it is converted into mercuric chloride in the stomach and acts as such. The ointment diluted with an equal quantity of soft paraffin is applied to the eyelids in "ophthalmia tarsi," and conjunctival inflammation. Considerable care is required in preparing ointments of yellow mercuric oxide for ophthalmic use, to ensure reduction of the mercury salt to the finest possible state of subdivision. Ointments may be specially made for this purpose by incorporating freshly precipitated and washed yellow oxide of mercury with hydrous wool fat and soft paraffin; so prepared, they are extremely effective and quite painless in use.

**HYDRARGYRI OXIDUM NIGRUM.**

BLACK OXIDE OF MERCURY.



*Synonyms.*—Hydrargyri Oxidum Cinereum; Grey Oxide of Mercury  
Suboxide of Mercury; Mercurous Oxide.

Black oxide of mercury,  $\text{Hg}_2\text{O}$ , may be prepared by treating solution of mercurous nitrate with excess of solution of potassium or sodium hydroxide, filtering, washing the precipitate, and drying without the aid of heat, while protecting from light. It may also be prepared by triturating mercurous chloride with solution of potassium hydroxide.

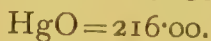
The pure oxide should be quite black, but being readily decomposed by light into mercuric oxide and metallic mercury it may have a brownish or greenish tinge. It is a very heavy, inodorous, tasteless powder. Insoluble in water, alcohol, or alkalies, but readily soluble in diluted nitric acid and acetic acid. When heated in a tube it acquires at first a red colour, then becomes darker, separating into oxygen and metallic mercury, and finally volatilises without residue. Shaken with water the filtrate should leave no residue on evaporation.

Black oxide of mercury is not much used except in its freshly precipitated form, as *Lotio Hydrargyri Nigra*. An ointment is sometimes prescribed as *Unguentum Cinereum*, containing 1 part of black oxide of mercury with 10 to 20 parts of lard; for antisyphilitic use.

*NOTE.*—Hahnemann's mercury is prepared by precipitating solution of mercurous nitrate with solution of ammonia.

**HYDRARGYRI OXIDUM RUBRUM.**

RED MERCURIC OXIDE.



*Synonyms.*—Red Precipitate; Red Oxide of Mercury.

Red mercuric oxide,  $\text{HgO}$ , may be prepared by heating mercurous nitrate until acid vapours cease to be evolved.

It occurs in orange-red crystalline scales, or as a levigated red powder. Insoluble in water, but soluble in diluted hydrochloric acid. It should be free from nitrates, and should answer to the tests given under *Hydrargyri Oxidum Flavum*.

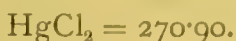
Red mercuric oxide is seldom used internally. It is applied in the form of ointment as a parasiticide; for application to syphilitic nodes and ulcers; for the reduction of enlarged glands and goitre, and in chronic eczema. Owing to its crystalline character and the difficulty in obtaining a minutely subdivided powder, red mercuric oxide is too irritating for ophthalmic use (see *Hydrargyri Oxidum Flavum*). For the preparation of the official and other ointments, the oxide should be in the finest possible powder.

*Dose.*—4 to 16 milligrams ( $\frac{1}{16}$  to  $\frac{1}{4}$  grain).



**HYDRARGYRI PERCHLORIDUM.**

MERCURIC CHLORIDE.



*Synonyms.*—Corrosive Sublimate; Hydrargyri Chloridum Corrosivum; Corrosive Mercuric Chloride; Bichloride of Mercury; Perchloride of Mercury.

Mercuric chloride,  $\text{HgCl}_2$ , may be prepared by heating a mixture of mercuric sulphate and sodium chloride with a little manganese peroxide, and collecting the sublimate. It should contain at least 99 per cent. of mercuric chloride.

It occurs in needle-shaped and prismatic crystals, or as heavy, colourless, crystalline masses, soluble in water (1 in 19), alcohol (1 in 5), purified ether (1 in 11), and slowly in glycerin (1 in 2). It should not contain more than a trace of non-volatile matter.

The action of mercuric chloride may be taken as typical of the more soluble mercury salts. They differ from the salts of other metals, except arsenic, in that they are rapidly absorbed into the system. This may be explained by the easy solubility of the albuminate. The soluble mercury salts are valuable antiseptics and disinfectants; 1 in 1000 of the perchloride is perhaps the most efficient disinfectant for general use, but even 1 in 1000000 will inhibit the growth of anthrax and most other micro-organisms. For utensils, clothing, etc., soaking with 1 in 2000 is enough, and for the disinfection of excreta an equal bulk of 1 in 1000 solution, acidified with hydrochloric acid (1 in 250), may be added. Mercury is a specific for all parasitic skin diseases; it is best employed as an ointment. Mercurial ointments rubbed into the skin are used also to reduce swellings and promote absorption of subcutaneous effusions, possibly by inhibiting amœboid movements and so hindering suppuration. Mercuric chloride is very easily and rapidly absorbed and produces specific effects early; it is not, therefore, so suitable for disinfecting the lower alimentary canal as some of the less soluble mercury salts such as calomel. It has a specific effect on most of the glands in the body, rousing them into activity during its excretion thereby; the salivation so characteristic of the early stages of poisoning is brought about in this way. The principal use of mercury is for syphilis, in which it acts by destroying the specific spirochæta of Schandinn. Metchnikoff has shown that, if the syphilitic virus be injected into men or monkeys, the development of the disease is completely prevented if a mercurial ointment is rubbed into the seat of inoculation one to two hours afterwards. Mercury is also specific in secondary syphilis, when the organism instead of being localised as in primary sores, has obtained access to the circulation. But to effect a cure it is generally regarded as necessary to continue mercurials for several months, and even then relapses are not very uncommon, long after every symptom has been relieved. In tertiary syphilis, which may be regarded as the scar left by the disease, the

use of mercury is less valuable. The drug can be administered in several ways. First, it can be given by the mouth, and for this purpose metallic mercury and the more insoluble salts are largely used; secondly, by inunction, rubbing the mercury daily into different parts of the skin following a definite order; thirdly, by hypodermic injection, especially when the specific effects are desired immediately, such soluble mercurials as the perchloride, succinimide, and sal alembroth being employed for hypodermic use, as well as oily suspensions of metallic mercury and calomel; lastly, the mercurial bath is especially useful in treating syphilitic skins, mercury sulphide or calomel being vapourised from a shallow dish by the heat of a spirit-lamp, and the salt allowed to deposit in a fine state of subdivision on the patient. In acute mercurial poisoning, there is virulent gastro-enteritis, death ensuing from collapse in a few hours; albumen, in any form, should be given, and followed by emetics. Chronic mercurial poisoning is characterised by salivation, fœtid breath, swollen and ulcerated gums, muscular tremors, and paralysis.

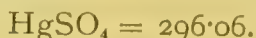
Mercuric chloride is commonly dispensed for internal use in mixtures, frequently with potassium iodide when mercuric iodide is formed, but it passes into solution in presence of an excess of the potassium salt. Pills may be prepared by carefully triturating the salt with sugar of milk, to secure intimate admixture, and massing with glycerin of tragacanth. For the preparation of lotions and other dilute solutions, a convenient glycerin solution of mercuric chloride may be made, containing 1 part, by weight, in 4 parts, by volume. This solution must be prepared without heat. For eye lotions, mouth washes, vaginal injections in leucorrhœa, and urethral injections, a strength of 1 in 5000 is sufficient. For general surgical purposes, solutions of from 1 in 10000 to 1 in 1000 are employed for application to wounds and for cleansing purposes. In the preparation of solutions for surgical purposes, 5 parts of tartaric acid are sometimes recommended to be added for each part of mercuric chloride used. This addition inhibits the formation of insoluble albuminate, and renders the antiseptic more effective. Gauze, wool, lint, etc., medicated with mercuric chloride, are prepared, but they lose their antiseptic properties owing to reduction of the mercuric salt by the organic material of the dressing, and sal alembroth dressings are therefore preferred. As a parasiticide to destroy pediculi, etc., a solution 1 in 2000 is used. Ointments of mercuric chloride ( $\frac{1}{2}$  to  $1\frac{1}{2}$  per cent.) are employed in parasitic skin diseases; as an antiseptic lubricant in obstetric practice, soft paraffin with 1 per cent. of mercuric chloride is used. In the preparation of ointments, the salt must be added in aqueous or glycerin solution. For intramuscular injection in syphilis, the mercuric chloride should be dissolved in 0.9 per cent. solution of sodium chloride, to minimise the pain to which these injections give rise. Mercuric chloride is incompatible with alkalis and their carbonates, tap water, lime water, lead acetate, silver nitrate, astringent decoctions and infusions, albuminous fluids, alkaloids (especially with potassium iodide), and soap. It corrodes

steel, and is therefore not suitable for sterilising steel surgical instruments. Steel implements must not be employed in compounding mercuric chloride preparations. In cases of poisoning by mercuric chloride, raw white of egg should be administered as an antidote, emetics should be given, and the stomach-pump employed.

*Dose*.—2 to 4 milligrams ( $\frac{1}{32}$  to  $\frac{1}{16}$  grain).

### HYDRARGYRI PERSULPHAS.

MERCURIC SULPHATE.



*Synonyms*.—Hydrargyri Sulphas Albus; White Sulphate of Mercury.

Mercuric sulphate,  $\text{HgSO}_4$ , may be obtained by boiling mercury in excess of strong sulphuric acid, with or without the addition of nitric acid, and, carefully and with constant stirring, continuing the heat until the crystalline powder becomes perfectly dry and white.

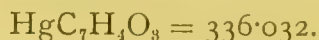
It occurs as a heavy white crystalline powder, which is immediately decomposed on contact with water, forming a heavy yellow salt, the oxysulphate,  $\text{HgSO}_4, 2\text{HgO}$  (turpeth mineral), and free sulphuric acid. The sulphate is soluble in hot diluted sulphuric acid. The salt becomes brown or orange-red at a high temperature, but white again on cooling. At a higher temperature it is decomposed. It should be free from iron.

Mercuric sulphate is not used medicinally; it is employed to excite small medical batteries, for which purpose it offers the advantage of portability, requiring merely to be moistened with water at the time of charging.

*NOTES*.—Mercuric oxysulphate (yellow subsulphate of mercury or turpeth mineral) must be carefully distinguished from mercuric sulphate. It was formerly used as an emetic for children in croup and diphtheria, as it is quick and certain and does not produce depression or purging. Emetic dose, 1 to 3 decigrams (2 to 5 grains). Dose, as a substitute for other mercurials, 15 to 30 milligrams ( $\frac{1}{4}$  to  $\frac{1}{2}$  grain). An ointment of mercuric oxysulphate (Unguentum Hydrargyri Oxysulphas) is sometimes employed (1 in 30 of benzoated lard) for ringworm and seborrhœa capitis.

### HYDRARGYRI SALICYLAS.

MERCURY SALICYLATE.



*Synonym*.—Mercuric Salicylate.

Mercury salicylate,  $\text{HgC}_6\text{H}_4\text{OCOO}$ , may be prepared by precipitating the mercuric oxide from 27 of mercuric chloride as directed in the case of Hydrargyri Oxidum Flavum, washing, placing in a flask with a little water and 15 of salicylic acid, and heating on a water-bath with agitation until the mixture is perfectly white. Collect the precipitate, wash until free from acid, dry at  $30^\circ$  to  $40^\circ$ , and finally at  $100^\circ$ . The product is an organo-metallic compound, in which the functions of the mercury are modified so that it is not precipitated by the usual reagents.

It occurs as a white, amorphous powder, tasteless, odourless, and



neutral to litmus paper. Insoluble in water or alcohol, but soluble in solutions of sodium hydroxide and sodium carbonate with formation of double salts. From these solutions it is reprecipitated by weak acids. It is soluble also in warm solutions of chlorides, bromides and iodides, the cooled solutions depositing double salts. Weak acids do not affect the salt, but the strong mineral acids decompose it. On ignition it is entirely volatilised (absence of sodium salicylate). If 5 decigrams be converted into the chloride by evaporating to dryness with 7 mils of nitric acid and 21 of hydrochloric acid, and the residue taken up with diluted hydrochloric acid and treated with hydrogen sulphide, it should yield not less than 0.34 gramme of mercuric sulphide, corresponding to 58.6 per cent. of metallic mercury. When shaken with water the liquid gives a violet colouration with ferric chloride. The salicylate is not decomposed by hydrogen sulphide or ammonium sulphhydrate.

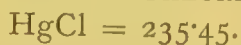
Mercury salicylate is used as an antiseptic and antisymphilitic, in the form of dusting powder and ointment (1 in 10), or given in pills massed with glycerin of tragacanth and a little powdered liquorice. A suspension in a mucilaginous vehicle (1 in 300) is used as an injection in gonorrhœa, 1 mil (15 minims) being injected at a time. For hypodermic injection, a suspension in liquid paraffin (1 in 10) is employed, its use being unaccompanied by pain. As a disinfectant the salicylate is as powerful as the perchloride, its great drawback being its insolubility; in order to overcome this difficulty the following formula has been devised:—Mercuric chloride, 1; sodium salicylate, 3; distilled water, sufficient to produce 100. Mercury salicylate is incompatible with potassium iodide.

*Dose.*—3 to 8 milligrams ( $\frac{1}{24}$  to  $\frac{1}{8}$  grain).

*NOTE.*—Neutral mercury salicylate,  $\text{Hg}(\text{C}_6\text{H}_4\text{OHCOO})_2$ , is comparatively non-irritant, and may be injected hypodermically in doses of 18 to 60 milligrams ( $\frac{3}{10}$  to 1 grain), suspended in liquid paraffin.

## HYDRARGYRI SUBCHLORIDUM.

MERCUROUS CHLORIDE.



*Synonyms.*—Calomel; Hydrargyri Chloridum; Hydrargyri Chloridum Mite; Mild Mercurous Chloride; Subchloride of Mercury.

Mercurous chloride,  $\text{HgCl}$ , may be prepared by heating a mixture of mercurous sulphate and sodium chloride, and collecting the sublimate, which should be washed with water until free from the perchloride, which is always formed during sublimation.

It occurs as a heavy, white, or light fawn powder. Insoluble in water, alcohol, or ether. It should be free from mercuric chloride and mercuric-ammonium chloride, and should contain not more than a trace of non-volatile matter. If 2 grammes of the salt be shaken with 20 mils of ether, filtered, and filtrate evaporated, and 10 mils of distilled water added, not more than a slight opalescence should be obtained on adding solution of silver nitrate to 5 mils of the filtrate, and no change in colour should be produced on adding a few

drops of ammonium sulphide to the remainder. When determined gravimetrically it should yield from 84.4 to 84.9 per cent. of metallic mercury, corresponding to 99.3 per cent. of mercurous chloride.

Calomel is less volatile and more insoluble than mercuric chloride, and the soluble albuminate is formed very slowly, so that for practical purposes calomel is non-corrosive to the alimentary canal. It is very useful for disinfecting the bowel, especially as its mild irritant properties induce a slight purgative effect. It enjoys a great reputation in the treatment of the common bilious attack, a condition probably due to excessive putrefaction in the gut; small repeated doses are of the greatest value. Calomel is also employed, probably in virtue of its antiseptic properties, in dysentery, cholera, and enteric fever, and it has been used for mercurial fumigation (see Hydrargyri Perchloridum). It is given in syphilis for its specific effects (see Hydrargyri Perchloridum). Calomel is mostly excreted unchanged in the fæces. Mercurous chloride is prescribed for internal use in the form of powders, pills, and cachets. The salt should be triturated with an equal weight of sugar of milk, and pills massed with syrup of glucose. Mucilage of acacia must not be used with calomel, as it forms an insoluble cement. Calomel is frequently combined with compound rhubarb or compound colocynth pill; it causes less irritation in the bowel if the dose be combined with 10 grains of sodium bicarbonate. It is also employed as Pulvis Basilicus and as Pilula Hydrargyri Subchloridi Composita. Calomel is used as an insufflation in syphilitic sore throat, and as a dusting powder to ulcers. In the form of ointment it is used as an anti-pruritic, in eczema, psoriasis, and pruritus ani. As a prophylactic against syphilis, Metchnikoff recommends an ointment composed of calomel, 1 part, with hydrous wool fat, 3 parts. It is employed as an intra-muscular injection in syphilis, but gives rise to intense pain; for this purpose 1 part of calomel is suspended in 10 parts of liquid paraffin, and an injection of 10 to 20 minims given once weekly. Calomel is incompatible with acids, alkali chlorides and hydroxides, soap, lime water, bromides, and iodides.

*Dose.*— $\frac{1}{4}$  to 3 decigrams ( $\frac{1}{2}$  to 5 grains).

*NOTES.*—Colloidal calomel (Calomelol) is a greyish-white, tasteless and odourless powder, containing 75 per cent. of mercurous chloride and 25 per cent. of albumen. Soluble in water (1 in 50) and weak saline solutions, but insoluble in alcohol. It is applied by inunction in the form of ointment (45 per cent.) with the addition of 2 per cent. of "killed" mercury; it is also made into a dusting powder (50 per cent.) with a mixture of equal parts of starch and zinc oxide. Crystalline calomel, so called, is prepared by adding a tepid solution of 12 of lithium sulphite to a solution of 27 of mercuric chloride, filtering off the precipitated calomel, and heating the clear liquid to 70° to 80°, when small lustrous scales of "crystalline calomel" are formed.

## HYDRARGYRI SULPHIDUM NIGRUM.

BLACK MERCURIC SULPHIDE.

HgS = 232.06.

*Synonyms.*—Ethiop's Mineral; Hydrargyri Sulphuretum Nigrum; Hydrargyrum cum Sulphure; Hydrargyri Sulphuretum cum Sulphure.

Black mercuric sulphide, HgS, exists naturally as a mineral in

California. It may be prepared by triturating mercury with excess of sulphur, moistening with diluted solution of ammonium sulphide, until mercury is no longer visible under the lens, and extracting excess of sulphur with carbon bisulphide. It is also formed by precipitating a solution of a mercuric salt with excess of hydrogen sulphide or ammonium sulphide, and drying the precipitate at a gentle heat.

It occurs as a heavy, black, or greyish-black, amorphous powder, without taste or odour. Insoluble in water, alcohol, or the diluted mineral acids. On account of its amorphous condition it is more easily decomposed than the red sulphide, into which it may be converted by sublimation, or by heating with solutions of the caustic-alkali sulphides. It should leave no residue on incineration, should contain no metallic mercury, but may contain sulphur in excess. It is rarely employed in medicine.

This compound was formerly regarded as an "alterative," and used in glandular and cutaneous diseases, but it possesses little or no medicinal activity.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### HYDRARGYRI SULPHIDUM RUBRUM.

RED MERCURIC SULPHIDE.

$\text{HgS} = 232.06.$

*Synonyms.*—Cinnabar; Vermilion; Chinese Red.

Red mercuric sulphide,  $\text{HgS}$ , is found naturally in large quantities. Commercially, however, vermilion is usually prepared in one of two ways. Either by subliming a mixture of pure mercury and pure sulphur, powdering the sublimate, and elutriating, or by the wet process, *i.e.*, triturating mercury and sulphur until black, adding solution of potassium hydroxide, and heating the mixture at about  $49^\circ$ . The former method is more commonly used.

It occurs as a brilliant, scarlet-red, heavy powder, very soft to the touch, and without taste or odour. Insoluble in water, alcohol, the diluted mineral acids and acetic acid; appreciably soluble in hot concentrated hydrochloric acid. Hot nitric acid decomposes it, precipitating a portion of the sulphur; nitro-hydrochloric acid dissolves it with decomposition; alkaline liquids have no effect. Exposure to light gradually destroys the bright colour, metallic mercury and sulphur separating at the exposed parts. Heated in a test-tube it becomes nearly black, yielding metallic mercury and sulphurous acid, and, if pure, volatilises without residue. It should be free from antimony and arsenium.

Vermilion has been employed in place of calomel for mercurial fumigation (see Hydrargyri Perchloridum). It is used as an antiseptic in chronic skin diseases in the form of ointment (1 or 2 per cent.), often with ammoniated mercury. This compound was formerly given internally and vaporised for inhalation in cases of



venereal ulceration of the nose and throat, but it is no longer employed medicinally.

NOTES.—The finer qualities of vermilion are said to owe their superiority of shade to the care used in subliming. The common adulterants of vermilion are red lead, lead chromate, brick-dust, chalk, and dragons' blood.

### HYDRARGYRI TANNAS.

MERCUROUS TANNATE.

*Synonym.*—Mercury Tannate.

Mercurous tannate may be prepared by triturating 50 parts of freshly prepared and oxide-free mercurous nitrate with 30 parts of tannic acid and 50 parts of distilled water, until a perfectly uniform paste is obtained. A large volume of water is then added, decanted, and the greenish precipitate repeatedly washed with cold water until free from nitric acid; collected, pressed, and dried between 36° and 40°.

It occurs as a dull brownish-green powder or in scales, without taste or odour; very dilute hydrochloric acid does not perceptibly alter it, but concentrated hydrochloric acid, especially in the presence of alcohol, changes it into mercuric chloride, tannic acid going into solution. Caustic alkalies and alkali carbonate produce a separation of metallic mercury in a very fine granular state, while the alkaline tannic acid solution, owing to oxidation, assumes a brown colour. If 3 decigrams of mercurous tannate be rubbed with 3 mils of water and filtered, 2 drops of the filtrate with 5 mils of diphenylamine reagent should not yield a blue colour (absence of nitric acid). The tannate should contain about 43 per cent. of metallic mercury.

Mercurous tannate is decomposed in the duodenum, and free mercury in a fine state of division is liberated, some of which is absorbed. This preparation produces a mild mercurial action without derangement of digestion or unpleasant after effects. It is given in pills massed with glycerin of tragacanth. A small dose of powdered opium is added, if necessary, to prevent diarrhoea.

*Dose.*—6 to 12 centimils (1 to 2 grains).

NOTE.—Mercurous tannate should be kept in well-closed amber-coloured bottles.

### HYDRARGYRUM.

MERCURY.

Hg = 200.00.

*Synonym.*—Quicksilver.

Mercury is a metal occurring in mines, partly in the metallic state, diffused in minute globules or collected in cavities, but chiefly in the form of cinnabar (mercuric sulphide, HgS). This ore is found chiefly in China, Spain, Austria, and California, and the mercury is extracted from it by roasting, when the sulphur is converted into sulphur di-

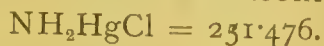
oxide, whilst the mercury passes off in vapour, and is condensed in suitable receivers. It is also obtained by distilling with lime.

It is a bright, silver-white metal, liquid at ordinary temperatures, and easily divisible into spherical globules. Boiling-point,  $357^{\circ}$ , at which temperature it readily volatilises, leaving only an insignificant amount of fixed residue. It solidifies at  $-39\cdot5^{\circ}$ , forming a ductile malleable mass. Specific gravity, 13·5. It becomes tarnished in contact with air containing traces of hydrogen sulphide. Impure mercury when poured over a clean glass plate leaves a track upon the glass, whilst pure mercury does not. It may be freed from mechanical impurities by squeezing through chamois leather. It is dissolved by nitric and sulphuric acids under suitable conditions, forming salts, mercurous and mercuric. Aqueous solutions of its salts with reducing agents precipitate metallic mercury as a dark grey powder which, on boiling the liquid containing it, agglomerates into a globule of fluid mercury. It may be reduced to a very fine state of division by trituration with various substances, such as chalk or grease. It unites with most other metals to form amalgams.

Mercury was formerly used in cases of intestinal obstruction, sometimes as much as a pound being taken in order to force the intestines into place; symptoms of poisoning rarely occurred. Mercury, in a finely divided state, is rapidly absorbed either through the skin or in the alimentary tract, producing the characteristic effects of mercury (see Hydrargyri Perchloridum). It is applied to the skin as Unguentum or Parogenum Hydrargyri, and for internal use it is employed as Pilula Hydrargyri and Hydrargyrum cum Creta. Hypodermic injections are prepared for use in syphilis, by triturating mercury, 1 part, with wool fat, 4, and liquid paraffin to make 10. The dose of 10 minims is injected once a week deeply in the gluteal region.

## HYDRARGYRUM AMMONIATUM.

AMMONIATED MERCURY.



*Synonyms.*—Ammonio-chloride of Mercury; Mercuric-ammonium Chloride; White Precipitate.

Ammoniated mercury,  $\text{NH}_2\text{HgCl}$ , may be prepared by dissolving 60 of mercuric chloride in 1200 of distilled water, and pouring the solution, with constant stirring, into 180 of solution of ammonia, diluted with 400 of distilled water; the resulting precipitate is collected on a filter, washed with cold water until nearly free from chlorides, and dried at a temperature not exceeding  $100^{\circ}$ .

It occurs as a white amorphous, odourless powder, or in friable masses, and has an earthy and somewhat metallic taste. Insoluble in water, alcohol, ether, and ammoniated water; soluble in hydrochloric acid, nitric acid and acetic acid, in hot solutions of ammonium salts, and in cold solution of sodium thiosulphate. It is

slowly decomposed by cold water; with boiling water a lemon-yellow basic compound,  $\text{NH}_2\text{HgCl}$ ,  $\text{HgO}$ , is formed. With solution of potassium hydroxide ammonia is evolved and the salt becomes yellow. On heating it also becomes yellow, and at a higher temperature it is decomposed and volatilises without fusing or leaving any appreciable residue. It should dissolve completely in hydrochloric acid without effervescence (absence of carbonate), and without residue (absence of mercurous salt, calcium sulphate, starch, etc.). Boiled with stannous chloride, metallic mercury is thrown down. Determined by means of hypophosphorous acid it should yield 76 to 77 per cent. of metallic mercury.

Ammoniated mercury or white precipitate is more irritant than the oxides of mercury, and it is not given internally. Its ointment is used in eczema and parasitic skin diseases, and especially to destroy pediculi. For this purpose the drug may be applied in the form of powder, or a lotion, prepared (1 in 20).

NOTES.—Ammoniated mercury cannot be obtained both colourless and free from chlorides by washing; if the washing be continued until all soluble chloride is removed the product will be yellowish in colour, but if a small amount of ammonium chloride be allowed to remain in the precipitate the product is white. In France, Portugal, and Spain "White Precipitate" signifies calomel made by precipitation.

## HYDRARGYRUM CUM CRETA.

MERCURY WITH CHALK.

*Synonym.*—Grey Powder.

Mercury with chalk is prepared by triturating mercury with twice its weight of prepared chalk until metallic globules can no longer be seen, and the powder is of a uniform colour.

It occurs as a light-grey, non-gritty powder. Insoluble in water. When treated with hydrochloric acid, the chalk dissolves with effervescence, leaving the mercury in a finely divided state, and the solution should yield no precipitate with solution of stannous chloride, thus indicating the absence of mercuric compound.

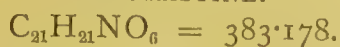
Mercury with chalk is used mainly as a remedy in syphilis, as a mild purgative, especially for children, and as an antiseptic in the alimentary canal.

It is given in powders or cachets, usually mixed with an equal weight of sugar of milk, or with rhubarb and bicarbonate of soda. Pills are prepared by massing with syrup of glucose, adding powdered liquorice to increase their size if necessary. It should be rubbed lightly in mixing with other powders or the mercury may separate.

*Dose.*— $\frac{1}{8}$  to 3 decigrams (1 to 5 grains).

NOTE.—Hydrargyrum cum Creta, U.S.P., is prepared by mixing 38 of mercury with 10 of clarified honey, till homogeneous, triturating the mixture with 57 of prepared chalk, made into a thick, creamy paste with water; then drying, and reducing to powder. The product is a light-grey, rather damp, sweetish powder. Average dose,  $2\frac{1}{2}$  decigrams (4 grains).



**HYDRASTINA.****HYDRASTINE.**

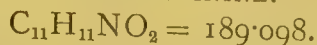
Hydrastine,  $\text{C}_{21}\text{H}_{21}\text{NO}_6$ , is an alkaloid obtained from the rhizome and roots of *Hydrastis canadensis*, Linn.

It occurs as white glistening prisms, having a very bitter and pungent taste. Soluble in alcohol (1 in 120), in ether (1 in 83), in chloroform (1 in 2), and in benzene, insoluble in petroleum ether and in water. Hydrastine melts at  $132^\circ$ . It may be oxidised to hydrastinine, and further oxidised to hydrastinic acid. It gives an alkaline reaction with litmus. With sulphuric acid a yellow colour is produced which becomes purple on heating. Sulphuric acid with a trace of molybdic acid gives a green colour, changing to olive-green, and then brown. Nitric acid produces a reddish-yellow colouration. Sulphuric acid with a trace of potassium bichromate yields a red colour, changing to brown. A solution in diluted sulphuric acid becomes fluorescent on the addition of solution of potassium permanganate (distinction from hydrastinine). It gives no red colour with chlorine water, by which reaction it may be distinguished from berberine, which reacts with a strong red colouration.

Hydrastine closely resembles narcotine chemically, and in some respects its physiological action is similar. Its effects are exerted mainly through the central nervous system, and its most important action is to produce a rise of blood-pressure through constriction of small vessels; it also slows and depresses the heart. Hydrastine is used to contract the uterus, and to arrest hæmorrhage by producing constriction of peripheral vessels. The effect on the uterus is very doubtful, and it is rarely, if ever, advantageous to attempt to arrest internal hæmorrhage by the administration of vaso-constrictors. It is given in pill form with extract of ergot or hamamelis; the soluble hydrastine hydrochloride may be given by hypodermic injection, 3 to 6 decimils (5 to 10 minims), of a 10 per cent. aqueous solution.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

*NOTE.*—Care must be taken not to confound hydrastine with the resinoid hydrastin (see *Extractum Hydrastis Siccum*).

**HYDRASTININA.****HYDRASTININE.**

Hydrastinine,  $\text{C}_{11}\text{H}_{11}\text{NO}_2$ , is an artificial alkaloid, obtained by the oxidation in acid solution of the natural alkaloid hydrastine; the hydrastinine thus obtained is purified by recrystallisation from benzene or acetic ether.

It occurs in the form of white or faintly yellowish acicular crystals, having an intensely bitter taste. Melting-point,  $116^\circ$  to  $117^\circ$ . Readily soluble in alcohol, ether, and chloroform, but not in cold

water, though moderately soluble in hot water ; also soluble in most acids, forming soluble salts, the hydrochloride being slightly fluorescent. Its aqueous solution is strongly alkaline. It is precipitated from its solution in acids by solution of potassium hydroxide, but not by ammonia or sodium carbonate. Nessler's reagent is instantly reduced by it, with formation of a black precipitate of mercury. This test is said to distinguish it from nearly all other alkaloids.

Hydrastinine resembles hydrastine in its action, but its effect upon peripheral vessels is more pronounced, and blood-pressure is therefore raised to a greater height. It is less depressant than hydrastine, and is employed on the supposition that it will check uterine hæmorrhage and strengthen feeble contractions in labour. Pure hydrastinine is not much used owing to its insolubility ; the soluble hydrochloride is given by hypodermic injection.

*Dose.*—30 to 90 milligrams ( $\frac{1}{2}$  to  $1\frac{1}{2}$  grain).

*Notes.*—Hydrastine is closely related to narcotine, and when oxidised the two substances yield respectively hydrastinine and cotarnine, opianic acid being split off in each case. Salts of cotarnine are much used in place of hydrastinine, owing to their lower cost.

## HYDRASTININÆ HYDROCHLORIDUM.

### HYDRASTININE HYDROCHLORIDE.



Hydrastinine hydrochloride,  $\text{C}_{11}\text{H}_{11}\text{NO}_2\text{HCl}$ , is a salt of the artificial alkaloid hydrastinine, which is produced by the oxidation of hydrastine.

It occurs in the form of pale yellow needle-shaped crystals, or as a yellowish-white crystalline powder, without odour and with a very bitter taste. Very soluble in water, hot and cold ; in alcohol (1 in 3), sparingly soluble in chloroform, and still less soluble in ether. It melts at about  $210^\circ$ . The aqueous solution is pale yellow in colour, and has a blue fluorescence which becomes more pronounced on further dilution with water ; it is optically inactive and neutral to litmus. An aqueous solution (1 in 20) should not be rendered turbid by solution of ammonia ; bromine water produces in a solution of the same strength a yellow precipitate, which should be perfectly soluble in ammonia, forming an almost colourless solution. Solution of potassium bichromate produces a yellow precipitate, which dissolves on gently heating, but separates again on cooling in yellow-red needle-shaped crystals. The addition of 2 or  $2\frac{1}{2}$  decimils of solution of sodium hydroxide to a solution of 1 decigram of hydrastinine hydrochloride in 3 mils of water causes a white turbidity, which, on shaking, should entirely disappear. On prolonged shaking or stirring of this solution, or on standing for some time, pure white crystals of hydrastinine should separate, the supernatant liquid remaining clear and almost free from yellow colour. It is said to reduce Nessler's reagent instantly, forming a black precipitate of metallic mercury, morphine and apomorphine being the only other

bases which give a more or less rapid reduction. On ignition the salt should leave no residue.

Hydrastinine hydrochloride has the physiological action of pure hydrastinine, but is preferred because of its greater solubility in water. It is used by hypodermic injection in 10 per cent. sterile aqueous solution.

*Dose*.—30 to 90 milligrams ( $\frac{1}{2}$  to  $1\frac{1}{2}$  grains), or more.

## HYDRASTIS RHIZOMA.

HYDRASTIS RHIZOME.

*Synonyms*.—Hydrastis; Golden Seal Rhizome.

Hydrastis rhizome is the product of *Hydrastis canadensis*, Linn. (N.O. Ranunculaceæ), a small perennial plant growing in the woods of Canada and the Eastern United States. The rhizomes and roots are collected in the autumn and dried.

The rhizome is small, yellowish-brown and tortuous, from 10 to 40 millimetres long, and 3 to 12 millimetres thick. It bears numerous, short, upright branches, terminated by cup-shaped scars left by the aerial stems. The lower surface and sides bear numerous brittle wiry roots, but these are often broken off, leaving small prominent scars. The rhizome is hard, and breaks with a resinous fracture; the transverse section varies in colour from dark yellow to dark yellowish-brown, and exhibits a ring of bright yellow, somewhat distant, narrow wood-bundles, surrounding a large pith. The odour is slight, but characteristic, the taste bitter.

The drug contains the alkaloids hydrastine, berberine, and canadine, together with resin, starch, volatile oil, etc. Hydrastine has been obtained in colourless prisms and occurs in the proportion of 1.5 to 3.2 per cent. Berberine (about 3 per cent.) crystallises in yellow needles. Canadine occurs in small quantity only. The drug yields about 5 to 8 per cent. of ash.

Hydrastis is a bitter; it is supposed to exert a beneficial action on mucous membranes, and is therefore given sometimes in chronic gastro-intestinal catarrh. The action of the alkaloid hydrastine in constricting vessels renders it useful in menorrhagia, but in post-partum hæmorrhage it has little effect, because in this condition the uterus should be contracted rather than the vessels; it is also employed in chronic inflammations of the uterine mucous membranes. The tincture, liquid extract, and dry extract (hydrastin) are preparations representative of the whole drug. They are used internally in mixture form, often with ergot and hamamelis. The tincture is diluted with 1 to 4 parts of water, or the liquid extract with 15 parts of water, as an astringent lotion in leucorrhœa, epistaxis, and nasal catarrh, or as a gargle in chronic pharyngitis.

*NOTES*.—The commercial drug occasionally contains as accidental admixtures the rhizomes of *Aristolochia serpentaria*, *Stylophorum diphyllum*, *Cypripedium parviflorum*, *C. pubescens*, etc., but the characters of hydrastis rhizome are so well marked that no other drug can easily be mistaken for it. Hydrastis, U.S.P., should yield not less than 2.5 per cent. of hydrastine.



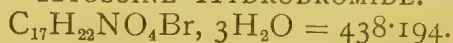
**HYGROPHILA.****HYGROPHILA.**

Hygrophila consists of the dried herb, including the root, of *Hygrophila spinosa*, T. And. (N.O. Acanthaceæ), a native of India.

The plant has tapering roots with numerous rootlets and erect bluntly quadrangular stems, which are swollen at the nodes and bear opposite leaves and branches. There are six entire leaves at each node, the two outer ones being 10 to 13 centimetres long and 12 millimetres broad; the four inner ones are 4 centimetres long, linear lanceolate, and tapering. A brownish spine about 2.5 centimetres long occurs in the axil of each leaf. The stem and leaves are more or less covered, especially near the nodes, with stiff three to five-celled hairs. Four pairs of awl-shaped flowers occur at each node, the bracts resembling the leaves in shape. The calyx has four sepals, one being broader than the others. The corolla is glabrous and two-lipped, with didynamous stamens and an oblong staminode on the lower lip. The fruit contains four to eight brownish flattened seeds about 2 to 3 millimetres long and 1 to 1.5 millimetres broad. When moistened the seeds exude a large quantity of a tenacious mucilage. The drug has no distinct odour or taste.

The chief constituent of hygrophila is mucilage. The plant also contains traces of an alkaloidal substance, together with phytosterin, fixed oil, etc.

Hygrophila is official in India and the Eastern Colonies, and a decoction of the drug is prepared for use as a demulcent and mild diuretic in catarrh of the urinary organs.

**HYOSCINÆ HYDROBROMIDUM.****HYOSCINE HYDROBROMIDE.**

*Synonyms.*—Hydrobromate of Hyoscine; Scopolamine Hydrobromide.

Hyoscine hydrobromide,  $\text{C}_{17}\text{H}_{21}\text{NO}_4\text{HBr}, 3\text{H}_2\text{O}$ , is a mixture of the hydrobromides of the lævo and inactive, stereoisomeric, varieties of an alkaloid obtained from *Datura alba*, Nees, *Hyoscyamus niger*, Linn., *Scopola* sp., and other Solanaceous plants.

It occurs in colourless, odourless, transparent crystals, with a somewhat bitter, acrid taste. Soluble in water (about 1 in 2), and alcohol (1 in 13), very slightly soluble in chloroform and ether. The official statements regarding the melting-point are somewhat misleading. If heated in a capillary tube the hydrobromide melts at about 100°, and remains liquid on further heating. If dehydrated over sulphuric acid the commercial salt melts at about 181°; the pure lævo salt at 193°, and the pure inactive salt at 180°. With auric chloride it forms a crystalline addition product, with melting-point 215°, but hyoscine aurichloride, prepared by dissolving the base in hydrochloric acid, and adding auric chloride, melts at 193°. Its aqueous solution gives no precipitate with solution of ammonia or

solution of potassium bichromate. If 2 mils of chloroform be shaken with 1 mil of a 10 per cent. solution of the salt and a few drops of chlorine water, a brownish colour will be produced. A trace of the salt added to a few drops of nitric acid and evaporated to dryness will yield on the addition of alcoholic potassium hydroxide a violet colour. Concentrated sulphuric acid gives no colouration when added to the dry salt, nor does the addition of nitric acid to this solution produce any colour (absence of carbonisable impurities and morphine). It should leave no residue on ignition.

Hyoscine resembles atropine in its paralysing effect upon peripheral nerve endings; its action in this respect, however, is quicker, more powerful, and less lasting. It does not produce the stimulating effect of atropine upon the brain; depression of the motor area is pronounced from the first. Hyoscine is therefore much used as a hypnotic, especially in mania and cerebral excitement. The action of lævo-hyoscine upon the peripheral nerve endings is twice as strong as that of the inactive variety; both isomers act similarly upon the central nervous system. Hyoscine hydrobromide is employed as a mydriatic (1 in 250) when the use of atropine is undesirable. As a sedative it is best given hypodermically, but a solution in chloroform water may be taken by the mouth. The use of hyoscine hydrobromide with morphine hydrochloride by hypodermic injection has been recommended previous to operation when a smaller quantity of general anæsthetic is required and less pain is felt upon recovery of consciousness.

*Dose.*— $\frac{1}{3}$  to  $\frac{2}{3}$  milligram ( $\frac{1}{200}$  to  $\frac{1}{100}$  grain).

## HYOSCYAMI FOLIA.

### HYOSCYAMUS LEAVES.

*Synonyms.*—Hyoscyamus; Henbane Leaves.

Hyoscyamus leaves, officially so called, consist of the fresh leaves, flowering tops, and branches of the biennial variety of *Hyoscyamus niger* (N.O. Solanaceæ), and the same parts of the plant carefully dried. Biennial henbane is an erect herb distributed over the whole of Europe, and cultivated in this country for medicinal purposes. The tops and branches are collected while the plant is in full flower.

The leaves vary considerably in size; the lower attain as much as 25 centimetres in length, and are stalked, but the upper are smaller and sessile. They are ovate oblong in shape, sinuate dentate or coarsely dentate in outline, and acute at the apex. They are pale green in colour, and clothed on both sides with long soft hairs, many of which secrete a resin which renders the leaves clammy and sticky to the touch; the midrib is broad and conspicuous. The flowers, which are crowded together, spring from the axils of large hairy bracts, and possess a green, hairy, gamosepalous calyx and

yellow, purple-veined gamopetalous corolla; they are succeeded by urn-shaped capsular fruits containing numerous minute seeds. The odour is characteristic, the taste bitter and slightly acrid. The broken or powdered leaves may be identified under the microscope by means of the abundance of small prismatic crystals of calcium oxalate contained in the mesophyll, as well as by the long hairs, most of which terminate in a pluricellular secreting gland.

The chief constituent of henbane leaves is the alkaloid hyoscyamine, together with smaller quantities of atropine and hyoscyne (scopolamine). The proportion of alkaloid in the official dried drug varies from 0.05 to 0.14 per cent. In isolated cases larger yields of alkaloid (up to 0.27 per cent.) have been reported, but these are exceptional. On incineration about 12 per cent. of ash is obtained.

Hyoscyamus is a cerebral and spinal sedative, owing to its contained hyoscyamine and hyoscyne (scopolamine). The comparatively small amount of atropine present does not give rise to the excitation and delirium occasioned by belladonna. It is therefore used in insomnia, especially when opium cannot be given. Hyoscyamus relieves the griping caused by drastic purgatives; exactly how it acts is not known, but it effectively removes the pain without diminishing the peristalsis; it is a common ingredient of aperient pills, especially those containing aloes and colocynth. It is powerfully sedative to the urinary unstriated muscle, and is given to allay irritability of the bladder and relieve pain in cystitis. The tincture is given in mixtures as an antispasmodic in asthma in place of stramonium. For this purpose *Succus Hyoscyami* is sometimes preferred. A sedative application for external use, known as "*Oleum Hyoscyami Infusum*," is prepared by macerating henbane leaves in alcohol, mixing the strong tincture with olive oil, and heating on a water-bath until the alcohol is dissipated. This preparation should be distinguished from the fixed oil obtained by expression from the seeds.

*Dose*.—2 to 6 decigrams (3 to 10 grains).

NOTES.—When grown in this country the official henbane plant is usually biennial, producing during the first year a rosette of radical leaves, and in the second year an erect branching and flowering plant. The leaves of the first year's growth are collected and sold under the name of "first biennial henbane." This variety consists of large stalked leaves attaining 30 centimetres or more in length, and is, of course, free from flower. Under favourable conditions the biennial plant will flower in the first year; this is also collected and sold as annual (English) henbane. It closely resembles the biennial, but the flowering tops are usually less dense, and the drug often contains portions of the stem. All these three varieties appear to be of good quality and of equal alkaloidal value. Much henbane is imported from the South of Europe; this is probably collected mostly from annual plants. Foreign annual henbane is usually a much more slender plant than the English, more stalky, and often badly preserved. Its alkaloidal value, 0.03 per cent., is lower than that of any of the English-grown varieties. This may be due to the large proportion of stem, sand, etc., that the drug contains, and it is probable that the well-dried leaves alone of all the varieties are of approximately equal alkaloidal strength. *Hyoscyamus*, U.S.P., should contain not less than 0.08 per cent. of mydriatic alkaloids.



**HYOSCYAMI SEMINA.**

HYOSCYAMUS SEEDS.

*Synonym.*—Henbane Seeds.

Hyoscyamus seeds are obtained from biennial henbane, *Hyoscyamus niger*, Linn. (N.O. Solanaceæ).

The seeds are of a dark grey colour, and very small in size, measuring slightly more than 1 millimetre in length. They are obscurely reniform in shape and flattened; under a strong lens the surface is seen to be regularly and distinctly reticulate. Each seed contains a coiled embryo embedded in an oily endosperm.

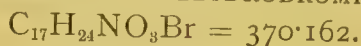
The chief constituent of the seeds is about 0.5 to 0.6 per cent. of alkaloid, consisting of hyoscyamine associated with hyoscine (scopolamine).

Henbane seeds are used as a domestic remedy for toothache; the smoke obtained by heating the seeds on a hot plate is applied locally by means of a funnel, or a poultice may be made from the crushed drug. The expressed oil was formerly used externally, but is now almost obsolete.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

**HYOSCYAMINÆ HYDROBROMIDUM.**

HYOSCYAMINE HYDROBROMIDE.

*Synonym.*—Hydrobromate of Hyoscyamine.

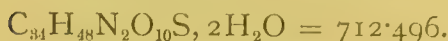
Hyoscyamine hydrobromide,  $\text{C}_{17}\text{H}_{23}\text{NO}_3\text{HBr}$ , is a salt of an alkaloid obtained from henbane, scopolia, and other Solanaceous plants.

It occurs in white, prismatic crystals, or in amorphous, yellowish, resin-like masses, with an odour resembling tobacco, and an acrid, bitter taste. Very soluble in water, also soluble in alcohol and chloroform, but only sparingly soluble in ether. Melting-point,  $151.8^\circ$ ; the aurichloride melts at  $160^\circ$ . It leaves no residue on ignition. The aqueous solution is strongly lævo-rotatory, and is neutral to litmus. A solution of the salt yields with solution of gold chloride a precipitate which, when recrystallised from a small quantity of boiling water, acidulated with hydrochloric acid, is deposited on cooling in minute, lustrous, golden-yellow scales (distinction from atropine). Platinic chloride solution gives no precipitate (distinction from most alkaloids). If 10 milligrams be added to  $2\frac{1}{2}$  decimils of nitric acid, evaporated to dryness, and alcoholic solution of caustic potash added, a violet colour should result. Hyoscyamine hydrobromide should give no colour with sulphuric acid (absence of carbonisable impurities), nor should colour be developed on the subsequent addition of a drop of nitric acid (absence of morphine).

Hyoscyamine hydrobromide has properties similar to those of hyoscyamine sulphate.

*Dose.*— $\frac{1}{3}$  to  $\frac{2}{3}$  milligram ( $\frac{1}{200}$  to  $\frac{1}{100}$  grain).

*NOTE.*—Hyoscyamine hydrobromide should be kept in well-stoppered, amber-coloured bottles.

**HYOSCYAMINÆ SULPHAS.****HYOSCYAMINE SULPHATE.**

Hyoscyamine sulphate,  $(\text{C}_{17}\text{H}_{23}\text{NO}_3)_2\text{H}_2\text{SO}_4, 2\text{H}_2\text{O}$ , is a salt of an alkaloid contained in henbane, scopolia, and other Solanaceous plants.

It occurs as a white, crystalline powder, without odour, but with a bitter, acrid taste. Soluble in water (2 in 1), alcohol (1 in 4.5), very slightly soluble in ether and chloroform. Its aqueous solution is lævo-rotatory and neutral to litmus. The tests described under Hyoscyaminæ Hydrobromidum are also applicable to this salt. The official melting-point is  $206^\circ$  (U.S.P.  $198.9^\circ$ ), but the commercial salt has a lower melting-point; it should not, however, be below  $200^\circ$ . The melting-point of the aurichloride is  $160^\circ$ . The sulphate should leave no residue on ignition.

Hyoscyamine is intermediate in its action between atropine and hyoscine. It causes less stimulation of the central nervous system than atropine, and is a weaker sedative and hypnotic than hyoscine (see Atropina and Hyoscine Hydrobromidum). It has the same action peripherally as atropine, but it is twice as powerful. The action of atropine is the resultant of the action of equal amounts of lævo-hyoscyamine (the natural alkaloid) and dextro-hyoscyamine, lævo-hyoscyamine being from twelve to fourteen times as powerful as dextro-hyoscyamine when acting on nerve endings. Hyoscyamine sulphate is used hypodermically, or given in pills for mental excitement and insomnia, especially in delirium tremens and mania. Doses of 0.6 milligram ( $\frac{1}{100}$  grain) are recommended in sea-sickness, one every hour, if required. The official dose is often exceeded; as much as 6 milligrams ( $\frac{1}{10}$  grain) may be given in mania.

*Dose.*— $\frac{1}{3}$  to  $\frac{2}{3}$  milligram ( $\frac{1}{200}$  to  $\frac{1}{100}$  grain).

*NOTES.*—Hyoscyamine sulphate should be kept in well-stoppered, amber-coloured bottles. Hyoscyaminæ Sulphas, U.S.P., is anhydrous.

**ICHTHYOCOLLA.****ISINGLASS.**

Isinglass is prepared from the dried swimming bladder of *Acipenser Huso*, Linn., and of other species of *Acipenser* (Class, Pisces; Order, Sturiones) found in the Caspian and Black Seas, and in the rivers that flow into them. After removal from the fish, the bladders are cut open, washed, and soaked in water; then spread on boards, and the outer silvery membrane removed by rubbing. They are then dried in sheets (leaf isinglass) or several are folded together before they are completely dry (book isinglass), or each bladder is rolled and folded round pegs in the form of a horse-shoe, heart, or lyre (staple isinglass). The product is generally further prepared for use by rolling it into thin sheets and cutting into short threads.

It occurs as a semi-transparent, iridescent, tough, membranous

tissue, without odour or taste, whitish or pale yellowish in colour, and of a horny or pearly appearance. It softens, swells, and becomes less transparent when soaked in water. It is almost entirely soluble in boiling water and in boiling diluted alcohol. A solution in boiling water (1 in 50) forms on cooling a transparent jelly.

The chief constituent of isinglass is gelatin, but it also contains about 3 per cent. of insoluble membrane, and from 15 to 20 per cent. of moisture. It leaves on incineration from 0.5 to 1.0 per cent. of ash.

Isinglass is used as a nutrient in place of gelatin and as a "fining" for wines. A strong solution of isinglass is spread on silk of various textures to make "Court Plaster" and surgeon's isinglass plaster; a similar plaster, with the solution spread upon white felt, is used to remove pressure from corns and bed-sores. Solution of isinglass is prepared by digesting 2 of isinglass, in shreds, with 100 of warm distilled water, for half an hour, with repeated shaking, and then filtering through clean moistened tow; it should be freshly prepared as required.

NOTES.—Russian isinglass exported from the Caspian Sea and Black Sea is considered the best. It should be almost colourless, translucent, free from odour and taste, and strongly iridescent. Brazilian isinglass is inferior to Russian, and may be distinguished by its yellowish or brownish colour. Other similar preparations made from the swimming bladder of the cod, ling, hake, etc., are characterised by a higher yield of ash and of substances insoluble in water.

## IGNATII SEMINA.

ST. IGNATIUS BEANS.

*Synonym.*—Ignatia Amara.

St. Ignatius beans are the dried ripe seeds of *Strychnos Ignatii*, Berg. (N.O. Loganiaceæ), a woody, climbing shrub indigenous to Samar and others of the Philippine Islands. The plant produces a large spherical or ovoid fruit, measuring 10 centimetres or more in diameter, and containing about a dozen seeds embedded in a pulp, from which they have to be separated.

The beans are of a dull, dark grey colour, and irregularly ovoid shape, measuring about 2.5 centimetres in length. Mutual pressure in the fruit has rendered them three, four, or five-sided and bluntly angular. Patches of the dull, greyish seed-coat bearing numerous, appressed hairs are to be found on them, but the greater part has been rubbed off, disclosing the dark endosperm. The hilum is visible at one end of the seed. The very copious endosperm is usually hollow in the centre, where the embryo with its small leafy cotyledons is to be found. The taste is very bitter.

The seeds contain from 2.5 to 3.0 per cent. of alkaloid, about two-thirds of which consists of strychnine and one-third of brucine. They contain therefore rather more strychnine than *nux vomica*.

St. Ignatius beans have the medicinal properties of *nux vomica* seeds. They are used principally as a bitter stomachic tonic. The



tincture is added to mixtures or given as drops; in Continental practice a more concentrated preparation (1 in 2) is used under the name "Gouttes Amères de Baumé." The powdered drug may be given in cachets or pills with other stomachics and digestives.

*Dose*.—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

## INDIGO.

### INDIGO.

*Synonyms*.—Indigo Blue; Indigotin.

Indigo is a colouring matter obtained chiefly from *Indigofera tinctoria*, Linn. (N.O. Leguminosæ), *I. Anil*, Linn., and other species, in Bengal, Java, and Guatemala. For the production of the colouring matter, which does not exist ready formed in the plant, the leafy shoots are collected and macerated with water, often with addition of lime. The greenish-coloured infusion is stirred so as to bring it into contact with air, and the indigo which is rapidly formed allowed to deposit, washed with water, pressed into cakes and dried.

Commercial indigo is usually seen in the form of brick-shaped cakes, about 6 centimetres long. It is of an intensely blue or bluish-violet colour, and assumes a fine bronze sheen when rubbed with a hard, smooth substance. It is close in texture, but not hard or granular, and is light in weight. It burns easily, producing purplish vapours and leaving a reddish ash.

The plant contains a yellowish glucoside, indican, which is readily hydrolysed in aqueous solution by dilute mineral acids or by ferments into indigo blue and a sugar, indiglucin. The indigo blue is insoluble in water and deposited as a blue sediment. Good indigo consists chiefly of indigo blue (from 90 per cent. down to as little as 20 in poor qualities), water (3 to 5 per cent.), and inorganic matter (5 to 10 per cent.). Small quantities of other substances, such as indigo brown and indigo red, etc., are also present. Indigo blue (or indigotin),  $C_{16}H_{10}N_2O_2$ , can be obtained in deep blue or coppery rhombic crystals, which are insoluble in water, diluted acids, or alkalis, slightly soluble in chloroform, but more easily in glacial acetic acid. Diluted nitric acid converts it into yellowish-red isatin.

Indigo is rarely used in pharmacy except as a test. Dissolved in strong sulphuric acid it forms indigotin-disulphonic acid, which after suitable treatment is sold in the form of a paste as indigo extract. Solution of indigo sulphate is prepared by heating 0.1 of dry indigo, in fine powder, with 1 of sulphuric acid, at  $100^\circ$ , for one hour, then pouring the mixture into 99 of sulphuric acid, shaking, and decanting the clear liquid. This solution is decolorised by free chlorine and by nitrates or nitric acid. The sodium salt of indigotin-disulphonic acid is used under the name "Indigo Carmine" as a staining agent in microscopy.

*NOTES*.—Many other plants belonging to a variety of natural orders yield indigo. The chief genus, however, is *Indigofera*. Some appear to contain indoxyl. Indigotin can also be produced synthetically from indoxyl, isatin chloride,

orthonitrophenylpropionic acid, and other bodies, and most of the indigo of commerce is so prepared. Prussian blue, a mixture of ferric ferrocyanide with ferrous ferricyanide, though closely resembling indigo in appearance, can readily be distinguished from it by warming with dilute solution of potassium hydroxide, filtering, acidifying, and adding a trace of ferric chloride, when a blue precipitate indicates Prussian blue.

## INFUSA.

### INFUSIONS.

Infusions for which special formulæ are not given, and for which there is no stated strength, may be prepared by placing 5 of the drug, in coarse powder, in a suitable vessel with a cover, adding 100 of boiling distilled water, allowing the infusion to stand for fifteen minutes in a warm place, and straining.

## INFUSA CONCENTRATA.

### CONCENTRATED INFUSIONS.

Concentrated infusions are preparations which, when diluted with seven times their volume of distilled water, yield products representing approximately the corresponding infusions of the British Pharmacopœia. Similar preparations have been used largely as substitutes for fresh infusions in cases of emergency, but the official *Liquores Concentrati*, which are preparations analogous to so-called "concentrated infusions," were introduced with the intention that medical men should prescribe them in place of the unofficial preparations. Those products, however, have not been received with favour, and the processes here described are recommended as yielding preparations of a more satisfactory character.

*The macero-expression process.*—Macerate the solid ingredients in 75 of the menstruum in a covered earthenware vessel for twenty-four hours, using slight pressure when the whole of the drug is not covered by the menstruum. Strain, if necessary, and press the marc. To the resulting liquid add the other ingredients specified in the monograph, and reserve. Repeat the above process a second and a third time for six hours each. Evaporate the weaker pressings over a water-bath, until the volume of the resulting liquor together with that of the reserved portion equals 100. Set aside for seven days, then filter. When diluted alcohol is used as a menstruum, the third maceration may be omitted, and for the second maceration only enough menstruum should be employed to make the expressed liquids, when united, measure 100. The diluted chloroform water is prepared by dissolving 1 mil of chloroform in a litre of distilled water. This is to be used not only when diluted chloroform water is directed to be employed as a menstruum, but also in the production of the diluted alcohol used for the same purpose.

*The repercolation process.*—Moisten one-half of the solid materials with sufficient menstruum to form a damp powder, set aside in a covered vessel for two hours, or until thoroughly

swollen, then pack in a percolator and percolate slowly with the menstruum. Moisten the rest of the drug with the first portion of the percolate, and, after standing for two hours, pack this in a second percolator, and, employing the first percolate as a menstruum, allow percolation to proceed slowly until the second percolate measures 60. To this add the alcohol and any tincture included in the formula, and reserve. Allow percolation to proceed until the marc is practically exhausted, collecting, if necessary, another 100 of percolate. Evaporate this over a water-bath to small bulk, mix with the reserved portion, and add, if necessary, sufficient of the menstruum to make the volume of the final product up to 100. Set aside for seven days and clarify. When diluted alcohol is the menstruum, percolation should only be carried on until 100 of percolate has been collected from the second percolator.

### INFUSUM ABRI.

#### INFUSION OF JEQUIRITY.

Jequirity Seeds, in powder	...	...	...	8'00
Distilled Water...	...	...	...	100'00

Heat the water to 50°, pour it on the powdered seeds, set the infusion aside till cold and decant. Boric acid is sometimes added to preserve this infusion, which otherwise readily undergoes decomposition.

Infusion of jequirity is applied as a lotion to the eyes, for granular lids and opacities of the cornea, but great caution is required in using it owing to the severity of the inflammation sometimes set up. Lotions one-fourth of this strength are sometimes used.

NOTE.—A serum antitoxic to jequirity is prepared and may be used to allay inflammation.

### INFUSUM ALSTONIÆ.

#### INFUSION OF ALSTONIA.

Alstonia, bruised	...	...	...	5'00
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for thirty minutes, in a covered vessel, and strain.

Infusion of alstonia is official in India and the Australasian and Eastern Colonies, where it is used as a bitter tonic, in malaria and chronic diarrhoea.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### INFUSUM ANDROGRAPHIDIS.

#### INFUSION OF ANDROGRAPHIS.

Andrographis, cut small	...	...	...	5'00
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.



Infusion of andrographis is official in India and the Eastern Colonies, where it is used as a bitter and stomachic.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### INFUSUM ANTHEMIDIS.

INFUSION OF CHAMOMILE.

Chamomile Flowers	...	...	...	5.00
Distilled Water, boiling	...	...	...	100.00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of chamomile is used as a vehicle for other bitters.

*Dose.*—30 to 60 mls (1 to 2 fluid ounces).

### INFUSUM ANTHEMIDIS CONCENTRATUM.

CONCENTRATED INFUSION OF CHAMOMILE.

Chamomile Flowers, in powder	...	...	40.00
Oil of Chamomile	...	...	0.20
Alcohol (20 per cent.), sufficient to produce...	...	...	100.00

Mix the oil of chamomile thoroughly with the powder, and exhaust by the repercolation process.

A product closely resembling infusion of chamomile is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—As a stomachic, 2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

### INFUSUM AURANTII.

INFUSION OF ORANGE PEEL.

Dried Bitter Orange Peel, cut small...	...	5.00
Distilled Water, boiling	...	100.00

Infuse the drugs in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of orange peel is a pleasant vehicle.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### INFUSUM AURANTII COMPOSITUM.

COMPOUND INFUSION OF ORANGE PEEL.

Dried Bitter Orange Peel, cut small...	...	2.50
Fresh Lemon Peel, cut small...	...	1.25
Cloves, bruised	...	0.63
Distilled Water, boiling	...	100.00

Infuse the drugs in the water for fifteen minutes, in a covered vessel, and strain.

This infusion forms an excellent vehicle for bismuth mixtures. The addition of mucilage to the mixtures is not necessary.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM AURANTII COMPOSITUM CONCENTRATUM.**

CONCENTRATED COMPOUND INFUSION OF ORANGE PEEL.

Dried Bitter Orange Peel, in No. 10 powder	20'00
Dried Lemon Peel, in No. 10 powder	5'00
Cloves, freshly powdered	2'50
Tincture of Lemon	5'00
Tincture of Orange	5'00

Alcohol, a sufficient quantity.

Diluted Chloroform Water, sufficient to produce 100'00

Macerate the powdered cloves in 20 of the alcohol for twelve hours, filter through cotton wool and pass through the marc sufficient alcohol to make the filtrate measure 20. Add the tinctures and set aside. Mix the other powders and follow out the macero-expression process with diluted chloroform water, adding the mixed tinctures to the reserved portion.

A product closely resembling compound infusion of orange is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM AURANTII CONCENTRATUM.**

CONCENTRATED INFUSION OF ORANGE PEEL.

Dried Bitter Orange Peel, in No. 10 powder...	40'00
Tincture of Orange	5'00
Alcohol	22'50

Diluted Chloroform Water, sufficient to produce 100'00

Prepare by the repercolation process.

A product closely resembling infusion of orange is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM AZADIRACHTÆ INDICÆ.**

INFUSION OF INDIAN AZADIRACH.

Indian Azadirach, finely rasped	1'00
Distilled Water, cold	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of Indian azadirach is official in India and the Eastern Colonies, where it is used as a bitter.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM BUCHU.**

INFUSION OF BUCHU.

Buchu Leaves, freshly broken	5'00
Distilled Water, boiling	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of buchu is a common vehicle for diuretics, and for urinary antiseptics and sedatives.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

### INFUSUM BUCHU CONCENTRATUM.

#### CONCENTRATED INFUSION OF BUCHU.

Buchu Leaves, bruised	...	...	...	40'00
Tincture of Buchu	...	...	...	22'50
Alcohol	...	...	...	10'00
Diluted Chloroform Water, sufficient to produce	...	...	...	100'00

Prepare by the macero-expression process.

A product closely resembling infusion of buchu is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—4 to 8 mills (1 to 2 fluid drachms).

### INFUSUM CALUMBÆ.

#### INFUSION OF CALUMBA.

Calumba Root, thinly sliced	...	...	...	5'00
Distilled Water, cold	...	...	...	100'00

Infuse the drug in the water for thirty minutes, in a covered vessel, and strain.

Infusion of calumba is a pure bitter, free from astringency and therefore compatible with salts of iron.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### INFUSUM CALUMBÆ CONCENTRATUM.

#### CONCENTRATED INFUSION OF CALUMBA.

Calumba Root, in No. 10 powder	...	...	40'00
Alcohol	...	...	25'00
Diluted Chloroform Water, sufficient to produce	...	...	100'00

Prepare by the macero-expression process. Before the addition of the alcohol to the reserved portion of percolate, the latter should be heated to a temperature of not less than 85°, and maintained thereat for five minutes.

A product closely resembling infusion of calumba is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).



**INFUSUM CARYOPHYLLI.**

## INFUSION OF CLOVES.

Cloves, bruised ... ..	2'50
Distilled Water, boiling ... ..	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of cloves is a useful vehicle for stimulant stomachics. It is carminative, slightly astringent, and antiseptic.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM CARYOPHYLLI CONCENTRATUM.**

## CONCENTRATED INFUSION OF CLOVES.

Cloves, in No. 10 powder ... ..	20'00
Alcohol (20 per cent.) sufficient to produce ... ..	100'00

Macerate the drug in 50 of the menstruum for seven days, strain, pack the marc in a percolator, and percolate slowly, first with the tincture, and subsequently with the alcohol, until the process is completed.

A product closely resembling infusion of cloves is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM CASCARILLÆ.**

## INFUSION OF CASCARILLA.

Cascarilla, in No. 10 powder ... ..	5'00
Distilled Water, boiling ... ..	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of cascarilla acts as a simple bitter.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM CASCARILLÆ CONCENTRATUM.**

## CONCENTRATED INFUSION OF CASCARILLA.

Cascarilla Bark, in No. 40 powder ... ..	40'00
Tincture of Cascarilla ... ..	7'50
Alcohol ... ..	20'00
Diluted Chloroform Water, sufficient to produce ... ..	100'00

Prepare by the macero-expression process.

A product closely resembling infusion of cascarilla is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM CATECHU.**

## INFUSION OF CATECHU.

Catechu, in coarse powder	...	...	...	3'50
Cinnamon Bark, bruised	...	...	...	0'50
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of catechu is used as a vehicle for astringent diarrhoea mixtures.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM CHIRATÆ.**

## INFUSION OF CHIRETTA.

Chiretta, cut small	...	...	...	5'00
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of chiretta is a bitter stomachic.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM CHIRATÆ CONCENTRATUM.**

## CONCENTRATED INFUSION OF CHIRETTA.

Chiretta, in No. 40 powder	...	...	...	40'00
Alcohol	...	...	...	25'00
Diluted Chloroform Water, sufficient to produce	...	...	...	100'00

Prepare by the repercolation process.

A product closely resembling infusion of chiretta is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM CINCHONÆ ACIDUM.**

## ACID INFUSION OF CINCHONA.

Red Cinchona Bark, in No. 40 powder	...	...	...	5'00
Aromatic Sulphuric Acid	...	...	...	1'25
Distilled Water, boiling	...	...	...	100'00

Pour the water on the powdered bark, mix, add the acid, infuse for an hour, in a covered vessel, and strain.

This infusion is a bitter tonic. It is incompatible with alkalies, alkali carbonates, soluble benzoates, and salicylates. The infusion is sometimes used in astringent gargles.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM COSCINII.**

## INFUSION OF COSCINIUM.

Cosciniun, thinly sliced	...	...	...	5'00
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for thirty minutes, in a covered vessel, and strain.

Infusion of coscinium is official in India and the Eastern Colonies, where it is used as a bitter.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM CUSPARIÆ.**

## INFUSION OF CUSPARIA.

Cusparia Bark, in No. 20 powder	...	...	...	5'00
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of cusparia is an aromatic bitter.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

**INFUSUM CUSPARIÆ CONCENTRATUM.**

## CONCENTRATED INFUSION OF CUSPARIA.

Cusparia Bark, in No. 40 powder	...	...	...	40'00
Alcohol	...	...	...	25'00
Diluted Chloroform Water, sufficient to produce	...	...	...	100'00

Prepare by the macero-expression process.

A product closely resembling infusion of cusparia is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**INFUSUM CUSSO.**

## INFUSION OF KOUSSO.

Koussou, in coarse powder	...	...	...	6'00
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel.

Infusion of koussou is used as an anthelmintic, and is given specially for tapeworms, the dose being administered in the morning on an empty stomach and followed by a brisk purgative.

*Dose.*—120 to 240 mils (4 to 8 fluid ounces), unstrained.



**INFUSUM DIGITALIS.**

## INFUSION OF DIGITALIS.

Digitalis Leaves, in No. 20 powder	...	...	...	0.68
Distilled Water, boiling	...	...	...	100.00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of digitalis is considered by many physicians the most active and trustworthy preparation of digitalis.

*Dose.*—8 to 16 mils (2 to 4 fluid drachms).

NOTE.—Infusum Digitalis, U.S.P., is prepared by pouring 50 of boiling water upon 1.5 of bruised digitalis, allowing to macerate for one hour, then straining, adding 10 of alcohol (95 per cent.), and 15 of cinnamon water, and passing sufficient cold water through the strainer to produce 100 by volume.

**INFUSUM DIGITALIS CONCENTRATUM.**

## CONCENTRATED INFUSION OF DIGITALIS.

Digitalis Leaves, in No. 20 powder	...	...	...	5.50
Alcohol	...	...	...	20.00
Diluted Chloroform Water, sufficient to produce	...	...	...	100.00

Prepare by the macero-expression process.

A product closely resembling infusion of digitalis is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—1 to 2 mils (15 to 30 minims).

NOTES.—This preparation deteriorates on keeping for more than a month, and should only be used in emergencies. It should be stored in small, completely filled, and well-closed bottles, protected from light.

**INFUSUM DULCAMARÆ.**

## INFUSION OF DULCAMARA.

Dulcamara, bruised	...	...	...	10.00
Distilled Water, boiling	...	...	...	100.00

Infuse the drug in the water for one hour, in a covered vessel, and strain.

Infusion of dulcamara has been used as a mild sedative and hypnotic, but its value is doubtful.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

**INFUSUM ERGOTÆ.**

## INFUSION OF ERGOT.

Ergot, freshly crushed	...	...	...	5.00
Distilled Water, boiling	...	...	...	100.00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of ergot is an extremely active preparation of the drug, when freshly made; but it is rarely used.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

**INFUSUM GENTIANÆ COMPOSITUM.**

COMPOUND INFUSION OF GENTIAN.

Gentian Root, thinly sliced	...	...	1'25
Dried Bitter Orange Peel, cut small	...	...	1'25
Fresh Lemon Peel, cut small	...	...	2'50
Distilled Water, boiling	...	...	100'00

Infuse the drugs in the water for fifteen minutes, in a covered vessel, and strain.

This infusion is used as a vehicle, and as an aromatic bitter.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM GENTIANÆ COMPOSITUM CONCENTRATUM.**

CONCENTRATED COMPOUND INFUSION OF GENTIAN.

Gentian Root, in No. 10 powder	...	...	10'00
Dried Bitter Orange Peel, in No. 10 powder	...	...	10'00
Tincture of Lemon	...	...	10'00
Tincture of Orange	...	...	5'00
Alcohol	...	...	17'50
Diluted Chloroform Water, sufficient to produce	...	...	100'00

Prepare by the repercolation process, using diluted chloroform water as the menstruum, and adding the mixed tinctures and alcohol to the reserved portion.

A product closely resembling compound infusion of gentian is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM JABORANDI.**

INFUSION OF JABORANDI.

Jaborandi Leaves, bruised	...	...	5'00
Distilled Water, boiling	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of jaborandi is used as a vehicle for other diaphoretics, but is not often ordered.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM KRAMERIÆ.**

INFUSION OF KRAMERIA.

*Synonym.*—Infusion of Rhatany.

Krameria Root, bruised	...	...	5'00
Distilled Water, boiling	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of krameria is used as an astringent in diarrhoea ; also as a gargle in relaxed throats.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### INFUSUM KRAMERIÆ CONCENTRATUM.

CONCENTRATED INFUSION OF KRAMERIA.

*Synonym*.—Concentrated Infusion of Rhatany.

Krameria Root, in No. 40 powder	...	...	40·00
Alcohol	...	...	25·00
Diluted Chloroform Water, sufficient to produce	...	...	100·00

Prepare by the repercolation process. Before the addition of the alcohol to the reserved portion of percolate, the latter should be heated to a temperature of not less than 85°, and maintained thereat for five minutes.

A product closely resembling infusion of krameria is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### INFUSUM LINI.

INFUSION OF LINSEED.

Linseed	...	...	3·50
Liquorice Root, in No. 20 powder	...	...	1·00
Distilled Water, boiling	...	...	100·00

Infuse the drugs in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of linseed is a domestic remedy for coughs and bronchitis.

*Dose*.—30 to 120 mils (1 to 4 fluid ounces).

*NOTE*.—Solid extract of liquorice is sometimes used instead of liquorice root, for flavouring this infusion.

### INFUSUM LUPULI.

INFUSION OF HOPS.

Hops, freshly broken	...	...	5·00
Distilled Water, boiling	...	...	100·00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of hops is used as an aromatic bitter and vehicle for tonics ; also as a mild sedative.

*Dose*.—30 to 60 mils (1 to 2 fluid ounces).

### INFUSUM LUPULI CONCENTRATUM.

CONCENTRATED INFUSION OF HOPS.

Hops, freshly broken	...	...	40·00
Alcohol, a sufficient quantity.	...	...	
Diluted Chloroform Water, a sufficient quantity.	...	...	



Prepare by the macero-expression process, diluting the alcohol with three times its volume of diluted chloroform water, and making the volume of the final product up to 100.

A product closely resembling infusion of hops is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose*.—4 to 8 mls (1 to 2 fluid drachms).

### INFUSUM MATICÆ.

#### INFUSION OF MATICO.

Matico Leaves, bruised...	...	...	...	5'00
Distilled Water, boiling	...	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of matico is used as a vehicle for urinary antiseptics and astringents.

*Dose*.—30 to 60 mls (1 to 2 fluid ounces).

### INFUSUM PRUNI VIRGINIANÆ.

#### INFUSION OF WILD CHERRY.

*Synonym*.—Infusion of Virginian Prune.

Wild Cherry Bark, in No. 20 powder ...	...	...	4'00
Glycerin ...	...	...	5'00
Distilled Water, sufficient to produce ...	...	...	100'00

Moisten the powdered bark with 6 of the water, set aside for one hour, then pack in a percolator, and percolate with more of the distilled water; collect the percolate in a vessel containing the glycerin, and continue percolation until the product measures 100.

This infusion may be used when a weaker preparation than Tinctura Pruni Virginianæ is desired, or as an addition to cough mixtures.

*Dose*.—30 to 60 mls (1 to 2 fluid ounces).

NOTE.—This preparation corresponds to Infusum Pruni Virginianæ, U.S.P.

### INFUSUM QUASSIÆ.

#### INFUSION OF QUASSIA.

Quassia Wood, finely rasped ...	...	...	1'00
Distilled Water, cold ...	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, strain, and allow to cool.

Infusion of quassia is a simple bitter, without astringency and, therefore compatible with salts of iron. It is also used as a rectal injection for thread worms.

*Dose*.—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

NOTE.—This infusion keeps better if boiled for a few minutes after straining.

**INFUSUM QUASSIÆ CONCENTRATUM.**

CONCENTRATED INFUSION OF QUASSIA.

Quassia Wood, in No. 20 powder	...	...	5·00
Alcohol	...	...	20·00
Diluted Chloroform Water, sufficient to produce	...	...	100·00

Prepare by the repercolation process.

A product closely resembling infusion of quassia is obtained by diluting 1 part of this preparation with 7 parts of distilled water. Though the quantity of quassia wood used in preparing the concentrated infusion is less in proportion, the bitterness of the diluted preparation is equal to that of the simple infusion, owing to complete exhaustion of the drug.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM RHEI.**

INFUSION OF RHUBARB.

Rhubarb Root, in thin slices	...	...	5·00
Distilled Water, boiling	...	...	100·00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of rhubarb is a stomachic and mild aperient, used commonly with antacids and carminatives.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM RHEI CONCENTRATUM.**

CONCENTRATED INFUSION OF RHUBARB.

Rhubarb Root, in No. 10 powder	...	...	40·00
Alcohol	...	...	25·00
Diluted Chloroform Water, sufficient to produce	...	...	100·00

Prepare by the repercolation process.

A product closely resembling infusion of rhubarb is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM ROSÆ ACIDUM.**

ACID INFUSION OF ROSES.

Red Rose Petals, dried and broken	...	...	2·50
Diluted Sulphuric Acid	...	...	1·25
Distilled Water, boiling	...	...	100·00

Infuse the petals in the acid and water for fifteen minutes, in a covered vessel, and strain.

Acid infusion of roses is used generally as the basis of astringent gargles, especially with alum or tannin. It is not compatible with

borax or alkalies, which change its colour to green. The infusion is sometimes prescribed with the sulphates of sodium and magnesium.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### INFUSUM ROSÆ ACIDUM CONCENTRATUM.

CONCENTRATED ACID INFUSION OF ROSES.

Dried Red Rose Petals, in No. 20 powder ... 20·00

. Diluted Sulphuric Acid, a sufficient quantity.

Alcohol (20 per cent.), a sufficient quantity.

Moisten the powder with sufficient alcohol mixed with one-fortieth its volume of diluted sulphuric acid, macerate for two hours, then pack in a glass percolator and percolate slowly with more of the acidulated alcohol, until  $92\frac{1}{2}$  has been collected. Add to this  $7\frac{1}{2}$  of diluted sulphuric acid, set aside for seven days, filter.

A product closely resembling acid infusion of roses is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### INFUSUM SCOPARII.

INFUSION OF BROOM.

Broom Tops, dried and bruised ... 10·00

Distilled Water, boiling ... 100·00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of broom is a vehicle for diuretics.

*Dose*.—30 to 60 mils (1 to 2 fluid ounces).

### INFUSUM SCOPARII CONCENTRATUM.

CONCENTRATED INFUSION OF BROOM.

Broom Tops, in No. 20 powder ... 80·00

Alcohol ... 25·00

Diluted Chloroform Water, sufficient to produce 100·00

Prepare by the repercolation process. Before the addition of the alcohol to the reserved portion of percolate, the latter should be heated to a temperature of not less than  $85^{\circ}$ , and maintained thereat for five minutes.

A product closely resembling infusion of broom is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

### INFUSUM SENEGÆ.

INFUSION OF SENEGA.

Senega Root, in No. 10 powder ... 5·00

Distilled Water, boiling ... 100·00



Infuse the drug in the water for thirty minutes, in a covered vessel, and strain.

Infusion of senega is a vehicle for diaphoretics and expectorants.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### INFUSUM SENEGÆ CONCENTRATUM.

#### CONCENTRATED INFUSION OF SENEGA.

Senega Root, in No. 20 powder	...	...	40·00
Strong Solution of Ammonia...	...	...	0·50
Oil of Wintergreen	...	...	0·15

Alcohol, a sufficient quantity.

Diluted Chloroform Water, a sufficient quantity.

Mix the powder with the strong solution of ammonia and sufficient alcohol, diluted with three times its volume of diluted chloroform water, to damp it evenly. Complete the repercolation process, and dissolve the oil of wintergreen in the product.

A product closely resembling infusion of senega is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### INFUSUM SENNÆ.

#### INFUSION OF SENNA.

Senna	...	...	...	...	10·00
Ginger, sliced	...	...	...	...	0·63
Distilled Water, boiling	...	...	...	...	100·00

Infuse the drugs in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of senna is a mild purgative, suitable as a vehicle for the sulphates of sodium and magnesium.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce); as a draught, 60 mils (2 fluid ounces).

### INFUSUM SENNÆ COMPOSITUM.

#### COMPOUND INFUSION OF SENNA.

Senna	...	...	...	...	6·00
Manna	...	...	...	...	12·00
Magnesium Sulphate	...	...	...	...	12·00
Fennel Fruit, bruised	...	...	...	...	2·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Infuse the senna, manna, and fennel fruit in 80 of boiling distilled water for half an hour; then strain with expression, dissolve the magnesium sulphate in the liquid, again strain, and make up the required volume with cold distilled water.

This preparation may be given in place of Mistura Sennæ Composita, when a non-alcoholic preparation is desired.

*Dose*.—60 to 120 mils (2 to 4 fluid ounces).

**NOTE**.—This preparation corresponds to Infusum Sennæ Compositum, U.S.P.

**INFUSUM SENNÆ CONCENTRATUM.**

CONCENTRATED INFUSION OF SENNA.

Senna Leaves, broken small ... .. 80·00

Strong Tincture of Ginger ... .. 2·50

Alcohol, a sufficient quantity.

Diluted Chloroform Water, a sufficient quantity.

Prepare by the macero-expression process, diluting the alcohol with three times its volume of diluted chloroform water. After completing the process, add the strong tincture of ginger, then heat on a closed vessel on a water-bath to a temperature of 85°, and maintain thereat for five minutes.

A product closely resembling infusion of senna is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm); as a draught, 8 mils (2 fluid drachms), diluted with water.

**INFUSUM SERPENTARIÆ.**

INFUSION OF SERPENTARY.

Serpentary Rhizome, in No. 10 powder ... .. 5·00

Distilled Water, boiling ... .. 100·00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of serpentary is an aromatic bitter.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM SERPENTARIÆ CONCENTRATUM.**

CONCENTRATED INFUSION OF SERPENTARY.

Serpentary Rhizome, in No. 20 powder ... .. 40·00

Alcohol ... .. 25·00

Diluted Chloroform Water, sufficient to produce ... .. 100·00

Prepare by the repercolation process.

A product closely resembling infusion of serpentary is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM TINOSPORÆ.**

INFUSION OF TINOSPORA.

Tinospora, thinly sliced ... .. 10·00

Distilled Water, cold ... .. 100·00

Infuse the drug in the water for thirty minutes, in a covered vessel, and strain.

Infusion of tinospora is official in India and the Eastern Colonies, where it is used as a bitter, having properties similar to those of calumba.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM TODDALIÆ.**

## INFUSION OF TODDALIA.

Toddalia, in No. 20 powder	...	...	10'00
Distilled Water, boiling	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of toddalia is official in India and the Eastern Colonies, where it is used as an aromatic.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

**INFUSUM UVÆ URSI.**

## INFUSION OF BEARBERRY.

Bearberry Leaves, bruised	...	...	5'00
Distilled Water, boiling	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of bearberry is a vehicle for diuretics and urinary antiseptics. It is important that the leaves be bruised, as a stronger infusion is thus obtained.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM UVÆ URSI CONCENTRATUM.**

## CONCENTRATED INFUSION OF BEARBERRY.

Bearberry Leaves, in No. 20 powder	...	...	40'00
Alcohol	...	...	25'00
Diluted Chloroform Water, sufficient to produce	...	...	100'00

Prepare by the repercolation process.

A product closely resembling infusion of bearberry is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**INFUSUM VALERIANÆ.**

## INFUSION OF VALERIAN.

Valerian Rhizome, bruised	...	...	2'50
Distilled Water, boiling	...	...	100'00

Infuse the drug in the water for fifteen minutes, in a covered vessel, and strain.

Infusion of valerian is used as a vehicle for carminatives and antispasmodics.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**INFUSUM VALERIANÆ CONCENTRATUM.**

## CONCENTRATED INFUSION OF VALERIAN.

Valerian Rhizome, in No. 20 powder	...	...	20'00
Strong Solution of Ammonia	...	...	0'30
Alcohol	...	...	25'00
Diluted Chloroform Water, sufficient to produce	...	...	100'00



Mix the powder with the strong solution of ammonia and sufficient chloroform water to damp it evenly, set aside for two hours and complete the repercolation process.

A product closely resembling infusion of valerian is obtained by diluting 1 part of this preparation with 7 parts of distilled water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## INJECTIONES HYPODERMICÆ.

### HYPODERMIC INJECTIONS.

Hypodermic injections are prepared by dissolving the required medicament in recently boiled and cooled distilled water, and the strength is indicated in parts per 100 parts by volume. In cases where the quantity of dissolved substance is small a nearly true percentage solution is obtained, but to be strictly accurate it should be described as weight in volume percentage, or w/v per cent., and corresponds to grammes per 100 mils; thus a 1 per cent. w/v solution contains 1 gramme per 100 mils (4.375 grains per fluid ounce). Those salts of the alkaloids which are most soluble and give the most stable products have been selected in preparing these solutions.

#### **Injectio Aconitinæ Hypodermica.** HYPODERMIC INJECTION OF ACONITINE.

Aconitine Nitrate ... .. 0.02 per cent.

Five decimils will contain 0.1 milligram of aconitine nitrate (about  $\frac{1}{640}$  grain in 8 minims).

*Dose.*—1 to 5 decimils (2 to 8 minims).

#### **Injectio Apomorphinæ Hypodermica.** HYPODERMIC INJECTION OF APOMORPHINE.

Apomorphine Hydrochloride ... 1.0 per cent.

Diluted Hydrochloric Acid ... 1.0 per cent.

Six decimils will contain 6 milligrams of apomorphine hydrochloride (about  $\frac{1}{10}$  grain in 10 minims). The solution should remain colourless.

*Dose.*—3 to 6 decimils (5 to 10 minims).

#### **Injectio Atropinæ Hypodermica.** HYPODERMIC INJECTION OF ATROPINE.

Atropine Sulphate ... .. 0.12 per cent.

Five decimils will contain 0.6 milligram of atropine sulphate (about  $\frac{1}{160}$  grain in 8 minims).

*Dose.*—1 to 5 decimils (2 to 8 minims).

#### **Injectio Betacainæ Hypodermica.** HYPODERMIC INJECTION OF BETA-CAINE.

Betacaine Lactate ... .. 4.0 per cent.

Five decimils will contain 2 centigrams of betacaine lactate (about  $\frac{1}{3}$  grain in 8 minims).

*Dose.*—1 to 5 decimils (2 to 8 minims).

**Injectio Cocainæ Hypodermica.** HYPODERMIC INJECTION OF COCAINE.

Cocaine Hydrochloride ... .. 10.0 per cent.

Salicylic Acid ... .. 0.15 per cent.

Three decimils will contain 3 centigrams of cocaine hydrochloride (about  $\frac{1}{2}$  grain in 5 minims).*Dose.*—1 to 3 decimils (2 to 5 minims).**Injectio Curare Hypodermica.** HYPODERMIC INJECTION OF CURARE.

Curare, in powder ... .. 10.0 per cent.

Make the curare into a paste by adding recently boiled and cooled distilled water, transfer the paste to a small funnel plugged with cotton wool, and gradually pour more of the water upon it until the required volume of filtered liquid is obtained.

*Dose.*—6 to 36 decimils (1 to 6 minims).**Injectio Ergotæ Hypodermica.** HYPODERMIC INJECTION OF ERGOT.

Extract of Ergot ... .. 33.33 per cent.

Carbolic Acid ... .. 1.0 per cent.

Six decimils will contain 2 decigrams of extract of ergot (about 3 grains in 10 minims).

*Dose.*—2 to 6 decimils (3 to 10 minims).**Injectio Ergotininae Hypodermica.** HYPODERMIC INJECTION OF ERGOTININE.

Ergotinine Citrate ... .. 0.12 per cent.

Five decimils will contain 0.6 milligram of ergotinine citrate (about  $\frac{1}{100}$  grain in 8 minims).*Dose.*—1 to 5 decimils (2 to 8 minims).**Injectio Ergotoxinæ Hypodermica.** HYPODERMIC INJECTION OF ERGOTOXINE.

Ergotoxine ... .. 0.12 per cent.

Five decimils will contain 0.6 milligram of ergotoxine (about  $\frac{1}{100}$  grain in 8 minims).*Dose.*—1 to 9 decimils (2 to 15 minims).**Injectio Homatropinæ Hypodermica.** HYPODERMIC INJECTION OF HOMATROPINE.

Homatropine Hydrobromide ... .. 0.6 per cent.

Five decimils will contain 3 milligrams of homatropine hydrobromide (about  $\frac{1}{20}$  grain in 8 minims).*Dose.*—1 to 5 decimils (2 to 8 minims).**Injectio Hydrargyri Perchloridi Hypodermica.** HYPODERMIC INJECTION OF MERCURIC CHLORIDE.

Mercuric Chloride ... .. 0.4 per cent.

Five decimils will contain 2 milligrams of mercuric chloride (about  $\frac{1}{32}$  grain in 8 minims).

This injection is given intramuscularly, in the gluteal region.

*Dose.*—1 to 5 decimils (2 to 8 minims).

**Injectio Hyoscinae Hypodermica.** HYPODERMIC INJECTION OF HYOSCINE.

Hyoscine Hydrobromide ... .. 0·12 per cent.

Five decimils will contain 0·6 milligram of hyoscine hydrobromide (about  $\frac{1}{100}$  grain in 8 minims).

*Dose.*—1 to 5 decimils (2 to 8 minims).

**Injectio Morphinae et Atropinae Hypodermica.** HYPODERMIC INJECTION OF MORPHINE AND ATROPINE.

Morphine Sulphate ... .. 6·00 per cent.

Atropine Sulphate ... .. 0·12 per cent.

Five decimils will contain 3 centigrams of morphine sulphate and 0·6 milligram of atropine sulphate (or about  $\frac{1}{2}$  grain and  $\frac{1}{100}$  grain, respectively, in 8 minims). The addition of atropine lessens the tendency to depression and prevents constipation.

*Dose.*—1 to 5 decimils (2 to 8 minims).

**Injectio Morphinae Hypodermica.** HYPODERMIC INJECTION OF MORPHINE.

Morphine Tartrate ... .. 5 per cent.

Three decimils will contain 15 milligrams of morphine tartrate (about  $\frac{1}{4}$  grain in 5 minims).

*Dose.*—1 to 3 decimils (1 to 5 minims).

**Injectio Pilocarpinae Hypodermica.** HYPODERMIC INJECTION OF PILOCARPINE.

Pilocarpine Nitrate ... .. 3·00 per cent.

Five decimils will contain 15 milligrams of pilocarpine nitrate (about  $\frac{1}{4}$  grain in 8 minims).

*Dose.*—1 to 5 decimils (2 to 8 minims).

**Injectio Strychninae Hypodermica.** HYPODERMIC INJECTION OF STRYCHNINE.

Strychnine Sulphate ... .. 0·4 per cent.

Five decimils will contain 2 milligrams of strychnine sulphate (about  $\frac{1}{30}$  grain in 8 minims).

*Dose.*—1 to 5 decimils (2 to 8 minims).

**INJECTIO HYDRARGYRI BINIODIDI.**

## INJECTION OF MERCURY BINIODIDE.

Mercuric Iodide ... .. 1·00

Potassium Iodide ... .. 4·00

Distilled Water, sufficient to produce ... .. 100·00

Dissolve the iodides in the distilled water.

The dilution of this solution to 100 times its volume, by the addition of distilled water, forms a 1 in 10000 solution of mercuric iodide, suitable for use as an antiseptic vaginal injection and for other purposes.



**INJECTIO IODOFORMI.**

## INJECTION OF IODOFORM.

Iodoform, in fine powder	...	...	...	10·00
Mucilage of Tragacanth...	...	...	...	20·00
Distilled Water	...	...	...	70·00

Mix the iodoform with the mucilage, and add the distilled water.

This injection is used for injection into sinuses; and, when diluted with 40 to 60 parts of warm water, as a bladder antiseptic.

**INJECTIO SULPHATUM.**

## INJECTION OF SULPHATES.

Zinc Sulphate	...	...	...	0·25
Copper Sulphate	...	...	...	0·25
Ferrous Sulphate	...	...	...	0·25
Alum	...	...	...	0·25
Distilled Water, sufficient to produce	...	...	...	100·00

Dissolve the salts in the distilled water.

This injection is used as an astringent injection in gonorrhœa and leucorrhœa.

**INJECTIO ZINCI SULPHATIS.**

## INJECTION OF ZINC SULPHATE.

Zinc Sulphate	...	...	...	0·75
Distilled Water, sufficient to produce	...	...	...	100·00

Dissolve the zinc sulphate in the distilled water.

This injection is used as an astringent injection in gonorrhœa and leucorrhœa.

**INSUFFLATIO BISMUTHI ET MORPHINÆ.**

## BISMUTH AND MORPHINE SNUFF.

*Synonym.*—Ferrier's Snuff.

Bismuth Subnitrate	...	...	...	75·00
Morphine Hydrochloride	...	...	...	0·40
Gum Acacia, in powder, sufficient to produce	...	...	...	100·00

Mix the powders.

This preparation is used as snuff, or with an insufflator, in nasal catarrh.

**INSUFFLATIO IODOFORMI.**

## IODOFORM SNUFF.

Iodoform, in fine powder	...	...	...	50·00
Bismuth Subnitrate	...	...	...	50·00

Mix the powders.

This preparation is used as an antiseptic nasal snuff, or the powder may be applied to the nose or ear with an insufflator.

**INSUFFLATIO MENTHOLIS.****MENTHOL SNUFF.**

Menthol, in powder	...	...	...	5'00
Ammonium Chloride, in fine powder	...	...	...	45'00
Boric Acid, in powder	...	...	...	50'00

Mix the powders.

This preparation is used as snuff, in nasal catarrh.

**INSUFFLATIO MENTHOLIS ET COCAINÆ.****MENTHOL AND COCAINE SNUFF.**

Menthol, in powder	...	...	...	2'50
Cocaine Hydrochloride	...	...	...	0'15
Ammonium Chloride, in fine powder	...	...	...	25'00
Camphor, in fine powder	...	...	...	5'00
Lycopodium, sufficient to produce	...	...	...	100'00

Mix the powders.

This preparation is used as snuff, in coryza.

**INULA.****ELECAMPANE.**

Elecampane consists of the root and rhizome of *Inula Helenium*, Linn. (N.O. Compositæ), a perennial plant indigenous to Europe and Asia, but cultivated for medicinal use in Holland, Switzerland, and Germany. The roots are collected in the autumn when the plants are two or three years old, and dried, the rhizomes and larger roots being sliced longitudinally to facilitate the drying.

The drug consists chiefly of the long, slightly tapering roots, varying in thickness from about 0·5 to 2·0 centimetres, the larger having been longitudinally sliced. The roots are of a light grey colour and hard, horny consistence. They break with a short fracture, and the smoothed transverse surface exhibits an indistinctly radiate wood separated from the cortex by a darker cambium line. In both wood and cortex large, scattered, dark brown, shining oil-glands are visible. The rhizome is usually in thin irregularly rounded slices, 4 or 5 centimetres in diameter. The drug has an agreeable aromatic odour, and aromatic, slightly bitter taste.

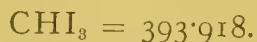
On distillation elecampane yields from 1 to 2 per cent. of a crystalline mass associated with a little volatile oil. The crystalline portion consists of helenin, alantolactone, iso-alantolactone, and alantolic acid, all of which are crystalline and nearly free from odour and taste. The oily portion has not yet been sufficiently investigated. Elecampane root also contains in the autumn a large quantity of inulin, which in the dried drug occurs in the form of transparent, amorphous masses in the parenchymatous cells of cortex and wood.

Elecampane root is not much used in medicine. A decoction (1 in 40), given in doses of 30 to 60 mils (1 to 2 fluid ounces), has been

recommended in chronic bronchitis and in tuberculosis. A liquid extract (1 in 1) has also been used. The active bitter principle helenin is stated to be particularly destructive to the tubercle bacillus; it is used in pill form, dose, 3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains), in bronchitis, tuberculosis, cholera, and diphtheria as a powerful antiseptic.

### IODOFORMUM.

IODOFORM.



*Synonym.*—Tri-iodo-methane.

Iodoform,  $\text{CHI}_3$ , is a product of the action of iodine on ethylic alcohol, in the presence of solution of potassium carbonate. It may also be prepared by subjecting a mixture of potassium carbonate and potassium iodide, dissolved in water and alcohol, to electrolysis. Iodoform should contain 96.69 per cent. of iodine.

It occurs in three forms (1) as "precipitated iodoform," a fine powder, tending to agglomerate, suitable for mixing with other powders and for the preparation of emulsions, suppositories, etc.; (2) as powdered crystals, for use with a dredger or insufflator, as they remain powdery and do not clog the apparatus; (3) as large crystals, preferred by some surgeons for application to extensive wounds. It has a characteristic persistent odour and a sweetish iodine-like taste. Very sparingly soluble in water or benzol, but more soluble in alcohol (1 in 120), ether (1 in 7), chloroform (1 in 14), and glycerin (about 1 in 100); it is also soluble in collodion, carbon bisulphide (1 in  $3\frac{1}{2}$ ), olive oil (1 in 30), other fixed oils, and volatile oils. Its aqueous solution is neutral to litmus, and although only slightly soluble it communicates a distinct odour and taste to the water. In the form of powder it sometimes contains a trace of moisture, consequently the solutions in chloroform and carbon bisulphide may be turbid; a short exposure to the air, however, will quickly free it from the adherent moisture, when bright solutions may be obtained. Specific gravity, 2.0. Melting-point,  $115^\circ$ , at which temperature it becomes a brown liquid. On further heating, vapours of iodine are given off, and a carbonaceous residue remains, which, on complete ignition, is entirely volatilised. Iodoform is slightly volatile, and may be slowly distilled in steam. On shaking 2 grammes with 10 mls of water the filtrate should be colourless and free from bitter taste, indicating absence of soluble yellow colouring matters, picric acid, etc., and should not give any reaction for iodides with solution of silver nitrate. On warming with alcoholic solution of potassium hydroxide and adding nitric acid, iodine is liberated. When boiled with solution of potassium hydroxide, it is partly volatilised with the steam and partly decomposed, yielding potassium iodide and potassium formate.

Iodoform is used for application to wounds in surgery as an antiseptic. It has very little germicidal power *in vitro*; it does not



destroy pathogenic organisms, though it inhibits the growth of putrefactive bacteria. Its beneficial action when applied to wounds appears to be due (1) to its effect in reducing secretion from the wounded surface by hindering the emigration of leucocytes from the blood vessels, and (2) to the fact that iodine is liberated by contact of the iodoform with the organic material of the tissues and secretions; the nascent iodine developed is thus the active antiseptic agent. It also has a marked local anæsthetic action. When taken internally, iodoform is partly absorbed as such and partly as iodide through decomposition. Absorption sometimes occurs from prolonged or extensive application of iodoform to wounded surfaces, with symptoms of iodism (see Iodine). When given internally, iodoform is prescribed in pills or in capsules, sometimes, if intended for use in phthisis, with oil of eucalyptus, guaiacol, and the like. Suppositories, pessaries, and bougies may contain oil of eucalyptus to mask its disagreeable odour; a so-called "aromatic" or "deodorised" iodoform (containing 2 parts of coumarin to 98 parts of iodoform) is also prepared for use in ointments or dusting powders. The odour may also be covered by dissolving the iodoform in 10 parts of Rubini's solution of camphor. For liquid suspensions of iodoform see *Emulsio Iodoformi* and *Emulsio Iodoformi sine Glycerino*. As an application to the throat, nose, and ear, *Insufflatio Iodoformi* is suitable; pastilles are prepared for use in syphilitic sore throat. *Collodium Iodoformi* is applied to venereal sores. *Pigmentum Iodoformi Compositum* (Whitehead's Varnish) is a solution of iodoform, benzoin, storax, balsam of tolu, and aloes in ether, and is used in surgery for application to such moist surfaces as the tongue. Iodoform gauze, wool and lint are largely employed as surgical dressings. Iodoform is incompatible with calomel.

*Dose*.— $\frac{1}{4}$  to 2 decigrams ( $\frac{1}{2}$  to 3 grains).

*NOTE*.—On account of its disagreeable odour, many substitutes for iodoform have been introduced, including butyl-cresyl iodide (Europhen), ethylene periodide (Diiodoform), iodoform-formamine (Iodoformin), iodoform albuminate (Iodoformogen), iodo-phenol-phthalein (Nosophen), iodopyrrol (Iodol), and thymol diiodide (Aristol).

## IODOPYRROLUM.

IODOPYRROL.

$C_4I_4NH = 570.998$ .

*Synonym*.—Tetraiodopyrrol.

Iodopyrrol,  $C_4I_4NH$ , is obtained by the action of iodine upon the base pyrrol in the presence of alcohol.

It occurs as a light, greyish-brown, almost odourless, crystalline powder. Almost insoluble in water, but soluble in alcohol (1 in 18), ether (1 in  $1\frac{1}{2}$ ), chloroform (1 in 150), glycerin (1 in 155), and fixed oils. When dissolved in sulphuric acid, it forms a green solution, which gradually changes to brown. It is decomposed when heated

above  $140^{\circ}$ , with liberation of iodine vapours; when ignited it should not leave more than 0.1 per cent. of residue.

Iodopyrrol possesses antiseptic properties, and is used as an odourless substitute for iodoform. It is given internally, and applied externally in the form of dusting powder, ointment (1 in 6), or as a 2 to 4 per cent. solution in alcohol, glycerin, or almond oil. Iodomenthol is a mixture of iodopyrrol with 1 per cent. of menthol, used for dental purposes, and in diseases of the nose, throat, and larynx.

*Dose.*—6 to 25 centigrams (1 to 4 grains).

NOTES.—Iodopyrrol is also known under the trade-name Iodol (Iodolum, U.S.P.). Iodopyrrol albuminate (Iodolen) is a light yellow powder, which is insoluble in water or alcohol. It is used as an antiseptic. Dose, 1 to 2 grammes (15 to 30 grains).

## IODUM.

### IODINE.

$I = 126.97$ .

Iodine is a solid non-metallic element obtained from the ashes of seaweed (kelp) by lixiviation with water, the crude iodides thus obtained yielding iodine by the action of manganese dioxide and sulphuric acid. Purified by resublimation. It is also obtained from the mother liquors of Chili saltpetre in South America.

It occurs in large, dry and friable bluish or greyish-black scales, rhombic plates, or prisms, having a metallic lustre, a distinctive penetrating odour, and an acrid taste. Very sparingly soluble in water (about 1 in 7000), but more soluble in alcohol (1 in 12), ether (1 in 4), chloroform (1 in 30), carbon bisulphide (1 in 6), and glycerin (1 in 65); also soluble in aqueous solution of potassium iodide. The solution in alcohol, ether, or aqueous solution of potassium iodide is reddish-brown; in chloroform or carbon bisulphide it is violet coloured. The solution in chloroform should be perfectly clear, indicating absence of moisture. In contact with the skin it produces a deep red-brown stain, which may be readily removed by alkaline or sodium thiosulphate solutions. Iodine is slowly volatile at ordinary temperatures, and entirely volatilises on heating. It melts at about  $115^{\circ}$  and boils at about  $180^{\circ}$ , evolving deep purple vapours, which condense upon a cool surface in shining scales, and should not include any slender colourless prisms emitting a pungent odour (absence of iodine cyanide). Specific gravity, 4.95. Aqueous solutions produce a deep blue colour with starch mucilage. On titration with volumetric solution of sodium thiosulphate not less than 99 per cent. of iodine should be indicated.

Iodine is absorbed into the circulation through the skin and appears as iodide in the urine. Free iodine is not much given internally, owing to its tendency to irritate the stomach; doses of 12 to 18 centimils (2 to 3 minims) of Tinctura Iodi are, however, sometimes given to check vomiting. Even in small doses it may cause symptoms of iodism, nasal catarrh, gastric irritation

and running of the eyes. (For the general properties of the iodides see Potassii Iodidum.) Preparations of iodine are applied to the skin as parasitocides and counter-irritants; strong solutions produce desquamation, or, if repeatedly applied, some degree of vesication. Liquor Iodi Fortis is painted on to destroy tinea and other parasitic fungi and as a counter-irritant to the chest in consolidation of the lung, or to promote absorption of serous fluid in pleurisy. Applied to enlarged glands or joints swollen by chronic inflammation, solutions of iodine cause absorption of inflammatory products through increased exudation of leucocytes; it is applied for a similar purpose to the thyroid gland in goitre. For application to the skin, Tinctura Iodi, Pigmentum Iodi, and Unguentum Iodi are also used. For inhalation, a few drops of the tincture are added to hot water and the vapour inhaled, often with the addition of creosote or carbolic acid, in phthisis and chronic bronchitis. Glycerinum Iodi is used for injection into tumours; for hypodermic injection, compounds of iodine with sesame oil are employed. Iodine forms a loose compound with starch paste, and is sometimes administered or applied in this form (see Pasta Iodi et Amyli). Iodine is incompatible with alkalis and alkali carbonates, oil of turpentine and most volatile oils, tannin and vegetable astringents. The antidotes to iodine poisoning are large draughts of milk, mucilage of starch, or wheaten flour mucilage.

*Dose.*—4 to 16 milligrams ( $\frac{1}{16}$  to  $\frac{1}{4}$  grain).

NOTES.—The crude iodine of commerce does not comply with the official tests, and the resublimed variety should be employed for medicinal use. Colourless preparations of iodine are a misnomer, as iodine only becomes decolourised on entering into combination with other bodies, hence the medicinal virtues of iodine as such must be considerably modified (see Tinctura Iodi Decolorata and Unguentum Iodi Denigrescens). Solution of iodine is prepared by dissolving 1.259 of pure iodine and 1.8 of pure potassium iodide in sufficient distilled water to produce 100 by volume.

## IPPECACUANHÆ RADIX.

IPPECACUANHA ROOT.

*Synonyms.*—Ipecacuanha; Ipecac.

Ipecacuanha root is obtained from *Psychotria Ipecacuanha*, Stokes (N.O. Rubiaceæ), a small plant indigenous to Brazil, and cultivated both there and in the Straits Settlements (Selangor). The plant grows in small clumps and produces numerous fibrous roots, many of which thicken and become filled with starch. The plants are raised from the ground, the roots removed, cleaned, and dried. Several commercial varieties of ipecacuanha are distinguished:—  
1. Rio ipecacuanha, which is the variety chiefly used. 2. Minas ipecacuanha, which is derived from the same plant, cultivated in the province of Minas Geraes in Brazil; this variety closely resembles the Rio, and contains about the same proportion of total alkaloid. 3. Indian ipecacuanha, also obtained from the same plant, cultivated in the Straits Settlements; it is rather larger than the Brazilian drug, which it otherwise closely resembles. All these three varieties



are official. 4. Cartagena ipecacuanha, which is derived from an unidentified species of *Psychotria* in Colombia; it is distinguished from all of the foregoing by its rather larger size (up to 10 millimetres in diameter) and by the annulations, which take the form of somewhat distant, narrow, raised ridges seldom extending quite round the root.

Rio ipecacuanha occurs in slender tortuous pieces of a reddish-brown or dark brown colour, the largest seldom exceeding 15 centimetres in length and 6 millimetres in thickness. It is characterised by its very distinct annulations, which resemble wedge-shaped discs. It is hard, breaking with a very short fracture, the transverse surface exhibiting a narrow dense wood, in which no vessels can be detected, surrounded by a thick cortex, which is usually horny but occasionally starchy in appearance. It has a slight odour and bitterish taste. Examined under the microscope the wood is seen to consist of tracheids, the oblique ends of which are often perforated, elongated fibrous cells, and wood parenchyma, but no true vessels. The parenchymatous cells of the cortex are filled with starch grains, and here and there with acicular crystals of calcium oxalate; there are no bast fibres. The cork consists of a few rows of narrow elongated cells. In the powdered drug the starch grains are the most conspicuous constituent; they are either simple or compound; the former are oval, or rounded grains, attaining  $12\mu$  in diameter, but never exceeding  $15\mu$ , the compound grains contain 2 to 5 constituent grains. The elements of the wood are characterised by the absence of vessels and presence of perforated tracheids. Acicular crystals of calcium oxalate may also be found.

The chief constituents of ipecacuanha root are the three alkaloids, emetine, cephaeline, and psychotrine, and the organic acid, ipecacuanhic acid. The root contains in addition much starch. The total alkaloid present varies in good samples of the root from 2 to 3 per cent. Of this total alkaloid, about three-fourths (72 per cent.) is emetine, one-fourth (26 per cent.) is cephaeline, while psychotrine forms only one-fiftieth (2 per cent.). Emetine is amorphous, but yields crystalline salts, cephaeline being crystallisable. All three alkaloids are injuriously affected by light and alkalies, emetine more readily than cephaeline. Ipecacuanhic acid is a glucoside resembling quillajic acid, though it is doubtful whether it is a true saponin. Ipecacuanha yields about 3 per cent. of ash on incineration. Cartagena ipecacuanha contains approximately the same quantity of total alkaloid, of which, however, only two-fifths (40 per cent.) is emetine and nearly three-fifths (57 per cent.) cephaeline. In consequence of this difference the physiological activity differs from that of the root of *P. Ipecacuanha*, and the drug is therefore excluded from official use.

The properties of ipecacuanha are virtually those of its principal alkaloids, emetine and cephaeline. In small doses it is a powerful expectorant, its action lasting several hours. Large doses are powerfully irritant to the whole gastro-intestinal tract, and produce

vomiting and diarrhœa. The powdered drug is extremely irritating to the nasal and laryngeal mucous membrane, producing violent sneezing and coughing. Ipecacuanha is used in small doses as an expectorant in acute and chronic bronchitis and in cough when secretion is scanty. It is well borne by children, and is largely used in croup and whooping-cough. Large doses are used for their emetic action, which is exerted in twenty to thirty minutes. Doses of 1 to 4 grammes (15 to 60 grains) are given in tropical dysentery, accompanied by opium if retention is difficult. The mode of action of ipecacuanha in this respect is not clearly known, but it would appear to exert a specific effect upon the parasitic amœbæ. For children and for general use as an expectorant, the wine and vinegar of ipecacuanha are commonly used. To produce diaphoresis in incipient colds, the compound powder of ipecacuanha is most suitable in the form of powder, pill, or cachet. In chronic diarrhœa following dysentery, the powdered drug is given in pills, 3 decigrams (5 grains) in each. These are best massed with simple syrup or syrup of glucose. For this purpose and for use in acute dysentery, powdered ipecacuanha freed from emetine has been recommended, but the entire drug is preferable. Lozenges of ipecacuanha, and of ipecacuanha with morphine and pills of ipecacuanha with squill, are prepared for use in cough. Preparations of ipecacuanha are not suitable for hypodermic use.

*Dose*.—As an expectorant, 15 to 120 milligrams ( $\frac{1}{4}$  to 2 grains); as an emetic, 1 to 2 grammes (15 to 30 grains).

NOTES.—Ipecacuanha, U.S.P., should contain not less than 2 per cent. of alkaloids. The following admixtures with, or substitutes for, ipecacuanha root have to be guarded against:—1. Stems of *P. Ipecacuanha*; these are slender, cylindrical, and longitudinally striated, instead of annulated. They contain less alkaloid than the root (1.0 to 1.8 per cent.) and should not be present in appreciable quantity. 2. Lesser striated ipecacuanha is dark grey in colour and constricted at irregular intervals; the cortex is violet (often dark) in colour and starchy, and the wood contains true vessels; it is probably derived from a species of *Richardsonia*. 3. Greater striated ipecacuanha, which resembles the above, but the cortex contains sugar instead of starch, and the wood is devoid of vessels; it is the root of *Psychotria emetica*, Linn. 4. Undulated ipecacuanha occurs in tortuous pieces bearing transverse lateral fissures; it possesses a porous wood and starchy, often violet, cortex. It is ascribed to *Richardsonia pilosa*, H. B. and K. 5. White ipecacuanha, derived from *Lonidium Ipecacuanha*, Vent., and easily distinguished by its yellowish colour and want of annulations as well as by its large, porous wood. 6. East Indian ipecacuanha (to be carefully distinguished from the cultivated, genuine ipecacuanha from the Straits Settlements), is the rhizome of a small monocotyledonous plant, and has the structure characteristic of such; it occurs in short, cylindrical pieces, many of which are terminated with a bud, and has no central wood, being therefore easily distinguished. All the above varieties and substitutes occur more or less frequently in commerce. Cartagena ipecacuanha is, however, the only one (other than the genuine) which is regularly imported in considerable quantity. None of them but the Brazilian (or Indian) and Cartagena contains the alkaloids characteristic of ipecacuanha. Powdered Cartagena ipecacuanha closely resembles genuine powdered ipecacuanha, but the largest starch grains often exceed  $12\mu$  and sometimes  $15\mu$  ( $17\mu$  to  $22\mu$ ), and the proportion of emetine to cephaeline is smaller.

## IRIDIS RHIZOMA.

ORRIS RHIZOME.

*Synonyms.*—Orris; Orris Root.

Orris rhizome is obtained from *Iris germanica*, Linn., *I. pallida*, Lamarck, and *I. florentina*, Linn. (N.O. Irideæ), all of which are cultivated in Italy. The rhizomes are dug up in the late summer, freed from the roots, growing portions, etc., then peeled, and slowly dried. When fresh it is almost odourless, the characteristic aroma developing during the slow drying and subsequent storage of the root. Several varieties of orris root are found in commerce. The best is Florentine, which is carefully peeled, pale in colour, plump, and very fragrant. Verona orris is less carefully peeled, has a yellowish colour, and is not so plump; many of the pieces have a hole at one end by which they have been suspended to dry.

The dried and peeled rhizome occurs usually in pieces from 5 to 10 centimetres long and 2.5 centimetres wide. They are whitish in colour, slightly flattened, and exhibit enlargements and contractions, each enlargement representing a year's growth. One or two short branches are usually attached to the larger extremity. The under surface bears numerous conspicuous, circular root-scars, and the upper surface indistinct leaf-scars or traces of the fibrovascular bundles of these which have passed from leaf to rhizome. The root is firm and compact. The transverse section shows a comparatively narrow cortex separated by a brownish cambium line from the large stele; the latter exhibits here and there small shining crystals of calcium oxalate. The powdered drug may be recognised by the starch grains, which are mostly simple ( $25\mu$  to  $30\mu$  long and  $10\mu$  to  $25\mu$  wide), oval or elliptical in outline, and with distinct branching hilum; it contains large ( $250\mu$  by  $30\mu$ ) prismatic crystals of calcium oxalate, thick-walled parenchymatous tissue, but no bast fibres.

Orris rhizome yields by distillation with steam from 0.1 to 0.2 per cent. of a yellowish, aromatic substance, solid at ordinary temperatures, and known as oil or butter of orris. About 85 per cent. of this is myristic acid, the remaining 15 per cent. consisting of irone, methyl myristate, oleic acid, esters, etc. Irone,  $C_{18}H_{20}O$ , is an oily liquid with a pungent odour, quite distinct from that of violets; the violet odour is, however, very perceptible when irone is dissolved in a large volume of alcohol and a little allowed to evaporate. The drug also contains a crystalline glucoside, iridin (which must be carefully distinguished from the resinoid obtained from *Iris versicolor*), abundance of starch, and a little resin. Orris rhizome yields about 5 per cent. of ash.

Preparations of orris rhizome were formerly used as mild cathartics and diuretics, but the dried root is used now only for its agreeable odour. Suitably shaped pieces of the root are given to infants to assist dentition, and are used also to perfume the breath. The powdered rhizome is a common ingredient of dentifrices and toilet powders. The volatile otto of orris is used in perfumery.



NOTES. —Mogadore orris rhizome is much darker than Italian, exhibits portions of reddish cork and the remains of buds, and is much inferior to both Florentine and Verona orris. Indian orris occurs in small, unpeeled pieces, with but little aroma.

## IRIS.

IRIS.

*Synonym.*—Blue Flag.

Iris consists of the dried rhizome and roots of *Iris versicolor*, Linn. (N.O. Irideæ), a perennial herb, growing in marshy ground in eastern and central North America.

It consists usually of the dried branches of the rhizome, from 5 to 10 centimetres long, and 1 to 2 centimetres thick, cylindrical in the lower portion, but becoming flattened towards the crown, where they give off numerous, long, slender roots. It is dark brown in colour, longitudinally wrinkled, and bears amplexicaul leaf scars. It breaks with a short fracture, exhibiting a dark purplish interior. The odour is characteristic; the taste pungent and acrid.

The drug contains a considerable portion of an acrid resin (25 per cent.), together with starch, tannin, trace of volatile oil, etc.

Iris is cathartic and diuretic, and is a common ingredient of anti-syphilitic and “blood-purifying” nostrums. Liquid and solid extracts are prepared, as well as the resinoid iridin. The liquid extract may be prescribed in mixture form with sarsaparilla and the alkali iodides. The solid extract is used in pill form with podophyllin and extract of henbane, as a hepatic and intestinal stimulant.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

## ISPAGHULA.

ISPAGHULA.

Ispaghula consists of the dried seeds of *Plantago ovata*, Forskohl (N.O. Plantagineæ), also known as *Plantago Ispaghula*, Roxburgh, an herbaceous plant growing in India and Persia.

The seeds are about 2 to 3 millimetres long and 1 to 1.5 millimetres wide, pale greyish-brown in colour, and boat-shaped, one end being slightly more pointed than the other. On the convex surface there is a small elongated brown spot. When soaked in water they become surrounded with a transparent, colourless mucilage. They have a mucilaginous taste, but no odour.

The chief constituent of the seeds is the mucilage which is contained in the seed-coat. The drug also contains proteids, fixed oil, etc.

Ispaghula is official in India and the Eastern Colonies, where it is used as an equivalent of linseed or barley, and the seeds are much used in the East in dysentery and diarrhoea. The decoction is employed as a cooling demulcent drink, or the seeds are mixed with a little sugar and taken dry. In this form they take up water in the intestinal canal, the resulting mucilage acting as a protection to the

inflamed mucous membranes. The crushed seeds mixed with hot water are used externally as a poultice.

NOTES.—*Psyllium* seeds are the dried seeds of *Plantago Psyllium* (*Psyllium pulicaria*), a native of Barbary and Southern Europe. They are much smaller than ispaghula seeds, and are brown in colour. The seed-coats contain a large quantity of mucilage, and the seeds are taken dry or mixed with water in chronic diarrhoea and in atony of the intestine with constipation. They are much used in Continental practice.

## JABORANDI.

### JABORANDI.

*Synonyms.*—*Pilocarpus*; *Jaborandi Leaves*.

*Jaborandi* consists of the dried leaflets of *Pilocarpus Jaborandi*, Holmes (N.O. Rutaceæ), a shrub indigenous to Brazil, and producing large, imparipinnate, compound leaves; these are collected, dried, and exported.

The leaflets are dull, brownish-green in colour, from 6 to 10 centimetres in length, oval-oblong, or oblong-lanceolate in shape, and coriaceous in texture. The margin is entire and the apex emarginate. The leaves are, with the exception of the terminal leaflet, unequal at the base, and shortly petiolate. The upper surface is glabrous, the lateral veinlets are distinctly prominent; the under surface sometimes bears a few scattered hairs. The mesophyll contains numerous oil glands, which are easily visible when examined by transmitted light. The crushed leaves emit a somewhat aromatic odour; they have a pungent and aromatic taste, and produce a copious flow of saliva when chewed.

*Jaborandi* contains three alkaloids, pilocarpine, isopilocarpine, and pilocarpidine, of which the pilocarpine is the most important, and occurs in the largest proportion; it is isomeric with isopilocarpine, which can be converted into pilocarpine by heating with alcoholic solution of potassium hydroxide. The leaves also contain from 0.2 to 1.1 per cent. of a volatile oil, which has a powerful odour, recalling rue. Pilocarpine occurs to the maximum extent of about 0.5 per cent.; it has not yet been obtained in crystals, but forms crystalline salts. Isopilocarpine exists in much smaller amount, and as its action is weaker than that of pilocarpine, the latter must be regarded as practically the only active constituent of the leaves. The drug yields about 7 per cent. of ash on incineration.

The properties of *jaborandi* are essentially those of the alkaloid pilocarpine (see *Pilocarpinæ Nitras*). Preparations of *jaborandi* are used to produce prompt diaphoresis, especially in kidney disease; they are also powerfully sialagogue, and to some extent galactagogue. The tincture and liquid extract are given in mixture form; they are also added to hair-lotions for their supposed effect in promoting the growth of the hair and restoring its colour. For constancy of action, the salts of the alkaloid pilocarpine are preferred rather than galenical preparations of the crude drug. Preparations of *jaborandi* are completely antagonised by those of belladonna.

NOTES.—Pilocarpus, U.S.P., should contain not less than 0.5 per cent. of alkaloids. Several substitutes for genuine jaborandi have appeared from time to time; the following are the most important:—Paraguay jaborandi, from *P. pennatifolius*, Lemaire. The leaves are of a greyish-green colour, and are less coriaceous; on the upper surface the veinlets are less prominent, and all the leaflets are equal at the base. They contain but little total alkaloid (0.2 to 0.3 per cent.). Rio Janeiro jaborandi, from *P. selleanus*, Engler, closely resembles the above, but the leaflets are more obovate. Maranhão jaborandi, from *P. microphyllus*, Stapf, average about 3 centimetres only in length, are deeply emarginate at the apex, and usually asymmetrical; the petiole is slightly winged. They contain about 0.8 per cent. of total alkaloid, of which about 0.5 per cent. is pilocarpine, and as they are exported in large quantities they form the chief source of pilocarpine. Ceará jaborandi, from *P. trachylophus*, Holmes; these are of less frequent occurrence, and are easily recognised by their olive-green colour, recurved margins, and by the abundant short curved hairs on the under surface. The leaves of *Piper jaborandi*, Vellozo, are large, thin, grey, and papery in texture; the stems exhibit distinct swelling at the nodes; they contain no pilocarpine. Guadeloupe jaborandi, from *P. racemosus*, Vahl., consists of large ovate leaflets attaining 17 centimetres or more in length. They contain from 0.5 to 1.00 per cent. of alkaloid, but what proportion of this is pilocarpine remains to be determined.

## JALAPA.

### JALAP.

Jalap consists of the dried tubercles of *Ipomœa Purga*, Hayne (N.O. Convolvulacæ), a climbing plant indigenous to the eastern slopes of the Mexican Andes. The tubercles are collected and then dried in nets over the fire, the larger ones being sliced to facilitate drying.

The drug occurs in irregularly, oblong-ovoid, napiform or fusiform roots, from 2.5 to 7.5 centimetres or more in length, the larger roots being cut. Externally they are dark brown, furrowed, and wrinkled, and marked with smaller transverse scars. They are hard and heavy, and break with difficulty, the internal surface being yellowish-grey or dull brown in colour. A transverse section exhibits irregular dark lines, often concentrically arranged, due to the formation of secondary cambium tissue. The taste of the drug is at first sweet, but afterwards acrid and disagreeable.

The tubercles contain resin, sugar, and starch, together with proteids, calcium oxalate, etc. The resin, which is the most important of these, varies from 5 to 18 per cent., 8 to 12 per cent. being frequently found. When treated with ether a portion only (7 to 9 per cent.) is dissolved; this appears to be identical with the resin obtained from scammony root and from the root of *I. orizabensis*, and has been designated scammonin (orizabin). The portion (about 90 per cent.) insoluble in ether is properly named jalapin, but has also been termed convolvulin and jalapurgin. Both resins are glucosidal, and can be hydrolysed by boiling with dilute mineral acid scammonin yielding scammonolic acid and glucose, and jalapin yielding jalapinol (convolvulinolic acid) and glucose. Part of the starch present has been gelatinised by the heat employed in drying the root. Powdered jalap is characterised by the abundant starch, much of



which may be found uninjured by heat; the grains are simple or compound (2 to 4); the former are rounded or ovoid, and measure commonly  $8\mu$  to  $50\mu$  in length; droplets of gum-resin are also abundant. Calcium oxalate occurs in rosette crystals; sclerenchymatous cells and portions of pitted vessels may also be found, but sclerenchymatous fibres should not be present. The drug yields about 6 per cent. of ash.

Jalap is a powerful purgative, producing copious watery evacuations. In large doses it causes considerable pain and inflammation. Its action is due to the alcohol-soluble resins (see *Jalapæ Resina*). Compound powder of jalap is used as a brisk cathartic in dropsy and renal disease. The dose may conveniently be given in one or more cachets. Powdered jalap is too bulky for use in pills, and resin of jalap or extract of jalap is more suitable for this purpose. The latter contains both the gum and resin of the crude drug. Jalap appears to act only in the presence of bile, and the addition of soap increases its purgative power. A tincture and a compound tincture are prepared, the latter especially for use in India and the Colonies.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

NOTES.—Jalap, U.S.P., should contain not less than 8 per cent. of total resin, and not more than 1.5 per cent. of resin soluble in ether. The following substitutes for true jalap appear in commerce:—Tampico jalap, the root of *I. simulans*, Hanbury. It may be distinguished by its irregular shape, convoluted surface, and absence of lenticels. It yields about 10 per cent. of resin (tampicin), which is entirely soluble in ether, and is identical with the ether-soluble resin of true jalap (scammonin). Orizaba jalap, also known as male or woody jalap, is the root of *I. orizabensis*, Ledenois. It occurs mostly as transverse slices, 5 to 10 centimetres long, and 1.5 to 2.0 centimetres thick, or portions of slices of large roots, and shows concentric rings from which coarse fibres protrude; smaller roots may be 2.5 centimetres in diameter and 8 to 10 centimetres long. The drug contains about 17 or 18 per cent. of resin (scammonin or orizabin) which is soluble in ether and identical with the ether-soluble resin of jalap. Large quantities of this root have been used in Germany for the production of the resin, and it should be observed that the term jalapin is frequently applied in Germany to the ether-soluble resin obtained from scammony and jalap, whereas in England it is applied to the ether-insoluble resin of true jalap.

## JALAPÆ RESINA.

### JALAP RESIN.

Jalap resin is prepared by the following process:—Digest 100 of jalap, in No. 40 powder, with twice its weight of alcohol, for twenty-four hours, at a moderate temperature; then transfer the mixture to a percolator, allow the liquid to pass, and exhaust the drug by percolation with more alcohol. Add 50 of distilled water to the percolate, recover the alcohol from the mixture by distillation, allow the residue to cool in an open dish, and dry the resin after washing it repeatedly with hot distilled water.

It occurs in dark-brown, brittle, opaque fragments, with translucent edges, or as a pale brown powder, with a sweetish odour and acrid taste. Soluble in alcohol, and partly soluble (about 10 per cent.)

in ether ; but insoluble in oil of turpentine, and almost or entirely insoluble in warm water. Its solution in alcohol should not be coloured bluish-green by ferric chloride, as would be the case if guaiacum resin were present as an adulterant.

The resin consists chiefly of the two glucosidal resins of jalap, the purified resin containing about 90 per cent. of jalapin and 10 per cent. of scammonin. It has the properties of crude jalap, but in a more concentrated form. It causes evacuation more rapidly than the anthracene purgatives, the stools are watery and profuse, and may be accompanied by considerable pain and tenesmus.

Jalap resin is given in pills, which are best massed with syrup of glucose. The addition of soap facilitates solution of the pill and enhances the action of the drug. It is used with scammony resin in the official compound scammony pill. Oleoresin of ginger is suitable as a carminative, for use with jalap preparations in pill form.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

## JALAPINUM.

### JALAPIN.

*Synonyms.*—Convolvulin ; Jalapurgin ; Rhodeoretin.

Jalapin is one of two homologous glucosides obtained from the tubercles of *Ipomœa Purga*, Hayne. The term jalapin is applied in England to the ether-insoluble portion of the resin obtained from jalap. It may be prepared by precipitating an alcoholic solution of the purified resin with ether.

It occurs as a pure white, odourless powder, and has an acrid and nauseating taste in alcoholic solution. Soluble in alcohol, glacial acetic acid, and acetic ether ; slightly soluble in chloroform ; insoluble in ether, petroleum ether, benzol, and water. The alcoholic solution is neutral, and reduces an ammoniacal solution of silver nitrate on gentle heating. It also reduces Fehling's solution after first heating with diluted mineral acid. Melting-point, 150° to 155°. It dissolves in alkalis with decomposition. On boiling with diluted mineral acid it yields glucose and jalapinol (convolvulinic acid). Concentrated sulphuric acid produces a red colouration. Oxidation with nitric acid converts it into oxalic and sebacic acids.

Jalapin possesses similar properties to jalap resin, but is considered to be less active. It may be given in a cachet, or in a pill prepared with syrup of glucose, and containing preferably soap and oleoresin of ginger or capsicum. It is sometimes prescribed with calomel as a brisk purge, and as an anthelmintic. When given by the mouth it cannot be found in either the fæces or urine, and would seem, therefore, to be destroyed.

*Dose.*—6 to 30 centigrams (1 to 5 grains).

*NOTES.*—Jalapin is said to be identical with pharbitisin, obtained from the seeds of *Ipomœa hederacea*, Jacq. (see under Kaladana). The name jalapin is also applied in Germany to the ether-soluble resin obtained from *Convolvulus Scammonia*, Linn., and *Ipomœa orizabensis*, Ledenois, which is less expensive, but also a less active purgative, than the ether-insoluble jalapin.

**JUS BOVINUM.**

## BEEF TEA.

*Synonym.*—Jus Bovillum.

Beef, fresh and free from fat	...	...	...	80·00
Sodium Chloride	...	...	...	0·50
Water	...	...	...	100·00

Finely chop, mince, or pound the lean beef with the salt, add the water, mix thoroughly, and set the mixture aside for ten minutes. Then heat the mixture in a water-bath, the water in which is heated to boiling-point, stirring the mixture and squeezing the meat at intervals, until the liquid has become brown and the odour of raw meat is no longer perceptible. Finally, stir the mixture vigorously, decant the liquid quickly, cool, and remove the fat from the surface by skimming.

Beef tea, prepared as described, contains nutritious flocks, which should be distributed evenly by stirring, when the liquid is warmed for use.

**KALADANA.**

## KALADANA.

*Synonym.*—Pharbitis Nil.

Kaladana consists of the dried seeds of *Ipomœa hederacea*, Jacq. (N.O. Convolvulacæ), a twining plant indigenous to India.

The seeds are about 5 millimetres in length and nearly black in colour, except at the micropyle, where they are brown. In shape they resemble the quarter of an orange, and usually bear a shallow groove on the dorsal surface. When soaked in water the seed-coats split, disclosing a thin endosperm surrounding the folded cotyledons. A transverse section also exhibits the folded cotyledons in which minute resin cells are visible.

The most important constituent of kaladana is a resin which has been termed pharbitisin. It appears to be identical with the ether-insoluble resin of jalap. The seeds also contain about 14 per cent. of fixed oils, together with mucilage, proteids, tannin, etc.

Kaladana is official in India and the Eastern Colonies, where it is used as an equivalent of jalap. A compound powder and a tincture are prepared, and are used in a similar manner to the corresponding preparations of jalap.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

**KALADANÆ RESINA.**

## KALADANA RESIN.

*Synonym.*—Pharbitisin.

Kaladana resin is prepared from kaladana by a process identical with that employed for the extraction of Jalapæ Resina from jalap.

It occurs in brownish, brittle, opaque fragments, with translucent edges, or as a grey powder, with a sweetish odour and acrid taste.



Soluble in alcohol, but insoluble in ether, benzol, chloroform, or carbon bisulphide, and almost or entirely insoluble in warm water. Melting-point,  $160^{\circ}$ .

Kaladana resin is official in India and the Eastern Colonies, where it is used as a substitute for jalap resin, which it closely resembles in its action.

*Dose*.—1 to 5 decigrams (2 to 8 grains).

## KAMALA.

### KAMALA.

*Synonym*.—Glandulæ Rottleræ.

Kamala consists of the glands and hairs covering the fruits of *Mallotus philippinensis*, Müller Arg. (N.O. Euphorbiaceæ), a small tree widely distributed through India and the Malay archipelago. It is collected chiefly in Orissa, Bengal, and Bombay. The small three-celled capsular fruits are densely covered with a reddish-brown powder easily detached by rubbing; this powder, freed from mechanical impurities by sifting, constitutes the drug.

It occurs as a fine, mobile, dull reddish-brown powder without odour and without any marked taste. It consists of minute garnet-red glands with which are associated nearly colourless tufts of hairs. Examined under the microscope the glands, which vary from  $40\mu$  to  $100\mu$  in diameter, have a depressed-globular shape and contain a varying number (thirty to sixty or more) of radiately arranged, club-shaped cells embedded in a dark red resinous mass surrounded by a thin cuticle. The resin is soluble in alcohol, ether, chloroform, etc., and in solution of potassium hydroxide, but not in water. The hairs are thick-walled, pointed and curved, and are arranged in radiating groups of two or three up to ten or more.

The chief constituent of kamala is a dark red resin. The drug also contains rottlerin, which crystallises in thin salmon-coloured plates, isorottlerin, which resembles rottlerin, a yellow resin, wax, a yellow, crystalline, colouring matter, etc. If quite pure it yields on incineration traces of ash (about 1.0 per cent.), but commercial kamala of good quality yields from 3 to 10 per cent. The drug is often grossly adulterated. Its quality may be roughly judged by throwing a little on to the surface of water, when such adulterants as sand, ferric oxide, etc., will sink, whereas kamala floats. Dyed starch may easily be detected by microscopical examination, which will also reveal such debris of leaves, etc., as may be present. Ground safflower which has been substituted for kamala may also be distinguished by the same means. Kamala is largely used in India as a dyestuff and anthelmintic.

Kamala is employed as an anthelmintic against tapeworm. It produces free purgation and is usually very efficacious, expelling the

worm. The powder may be given mixed with honey, gruel, or treacle, or made into a draught with mucilage of acacia and water.

*Dose*.—2 to 8 grammes (30 to 120 grains).

NOTES.—Waras or wurrus is a substance similar to kamala, obtained from *Flemingia congesta*, Roxb. (N.O. Leguminosæ), a large shrub growing in India and Africa. It is a dark, dull, purplish powder, and consists of single (not grouped) hairs and dark glands; in the latter the secreting cells are arranged in tiers and not radiately. Waras contains a dark red resin, an orange-brown resin, an orange-red crystalline substance, flemingin, and small quantities of a yellow crystalline substance, homoflemingin. These principles resemble those of kamala, but are not identical with them. Like kamala, it is largely used in India as a dyestuff, dyeing silk a golden-yellow.

## KAOLINUM.

### KAOLIN.

*Synonyms*.—China Clay; Porcelain Clay.

Kaolin is a fine, white clay, which consists chiefly of aluminium silicate ( $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2, 2\text{H}_2\text{O} = 259.032$ ). It is derived from the decomposition of the felspar of granitic rocks, and contains approximately 47 per cent. silica, 40 per cent. alumina, and 13 per cent. water. It is found in large quantities in Cornwall, and is freed from gritty particles by elutriation.

It occurs as a soft white, or slightly yellowish-white, powder, which is odourless when dry, but develops a clay-like odour when moistened. It has an earthy taste, is insoluble in all the ordinary solvents, and is unaffected by most chemical reagents. It darkens in colour on being moistened with water. When kaolin is fused with alkalis, silicates and aluminates of the alkali metals are formed. The fused mass dissolves partially in water, the solution depositing silica in a hydrated condition when filtered and acidified with hydrochloric acid, while the acid filtrate yields aluminium hydroxide on making it alkaline with ammonia. Kaolin should not contain more than traces of iron, and on ignition it should not leave less than 85 per cent. of non-volatile residue.

Specially prepared varieties of kaolin are used in place of fullers earth as dusting and toilet powders; they are absorbent and prevent irritation due to friction. Kaolin is also employed for its absorbent properties in the preparation of pill-masses, especially in the presence of substances that are readily oxidised or reduced (*e.g.*, *Pilula Phosphori Composita*). In the form of *Massa Kaolini*, it is used to prepare pills of potassium permanganate, silver nitrate, silver oxide, and other similar substances, which would be reduced by contact with the organic matter of ordinary pill excipients. Kaolin forms a "silicate base" for many carbolic and similar disinfectant powders. It has recently been used as the basis of a cleanly form of poultice (see *Cataplasma Kaolini*), intended to replace the domestic linseed or bread poultice. Kaolin is also used as a filtering medium, to clear syrups and cloudy solutions of volatile oils.

**KAVÆ RHIZOMA.****KAVA RHIZOME.**

*Synonym.*—Kava-kava.

Kava rhizome is obtained from *Piper methysticum*, Forster (N.O. Piperaceæ), a shrub indigenous to the Sandwich Islands. For medicinal use the periderm and roots are removed from the rhizome, which is then cut longitudinally or transversely into irregular pieces and dried.

The rhizome occurs in white or pale greyish-brown, irregularly cubical or wedge-shaped pieces, which vary from 1 to 5 centimetres or more in thickness, and are more or less porous in texture. A transverse section exhibits a dense central pith, surrounded by a ring of narrow, radiating, vascular bundles, separated by medullary rays. The rhizome breaks with a starchy fracture. it has a slight, rather pleasant odour, and a pungent, bitter taste.

The active constituents of the drug appear to be two resins,  $\alpha$ -kava and  $\beta$ -kava resins. In addition to these the drug contains two inactive crystalline substances, kavahin (methysticin) and yangonin, together with abundance (50 per cent.) of starch. Kavahin melts at about 133°; it is a derivative of protocatechuic aldehyde, and yields piperonal by oxidation. An alkaloid, kavaine, is also said to be present, but this is doubtful.

Kava rhizome is official in the Australian Colonies. It resembles pepper in its local action, and like pepper it is employed medicinally as a stimulant diuretic in gonorrhœa and cystitis. A liquid extract is prepared for use in mixture form with bladder sedatives and diuretics; by removal of the spirit from the liquid extract, a solid extract is obtained, which is given in capsule form with oil of sandal wood in gonorrhœa and catarrhal conditions of the genito-urinary organs. It is used in the South Sea Islands for preparing an intoxicating drink; the intoxication is said to effect the power of movement, whilst leaving the intellect intact.

**KERATINUM.****KERATIN.**

Keratin is a proteid substance, which forms the chief part of horns, hoofs, feathers, wool, etc. It contains the elements carbon, hydrogen, oxygen, nitrogen, and sulphur, the latter being in very loose combination, and in variable proportions. Keratin may be obtained by macerating horn shavings for some days in a mixture of equal parts of ether and alcohol, decanting the liquid, and washing the residue with warm water. The washed shavings are then treated for some hours with an acidified solution of pepsin at 40°. After further washing with distilled water the residue is dried and powdered. It may be further purified, by boiling with glacial acetic acid for about thirty hours, in a flask fitted with a reflux condenser, filtering the solution thus obtained through glass wool,



and evaporating it to a thick syrupy consistence, after which it may be spread on glass plates, dried between 60° and 70°, and scaled.

It occurs as a brownish-yellow powder, or in transparent, white, or greyish-white scales, without taste or odour. Soluble in concentrated acetic acid, caustic alkalies, and ammonia, but insoluble in cold water, alcohol, ether, diluted acetic acid, or acid pepsin solutions. It may be softened by long boiling in water, and is decomposed by boiling under pressure, a turbid solution being formed, and hydrogen sulphide liberated. Boiling with diluted sulphuric acid converts it into leucine, tyrosine, and other products. On burning keratin, an odour resembling that of burnt feathers is evolved, and the carbon remaining is very difficult to incinerate. On complete combustion it should not leave more than 1 per cent. of ash. After twenty-four hours' digestion with fifteen times its volume of solution of ammonia or glacial acetic acid, at 25° to 40°, keratin should not leave more than 3 per cent. of insoluble residue.

Keratin is used in pharmacy mainly for the purpose of coating pills, tablets, and capsules that are required to pass through the stomach unchanged, in order that the contents may exert their action only in the intestines. The keratin is not dissolved by the normal gastric secretion, though it is affected by acetic, citric, and tartaric acids, which should therefore not be given at the same time. On reaching the duodenum, the keratin coating is dissolved and the enclosed drug liberated. For the method of coating with keratin see under *Liquor Keratini*.

## KIESELGUHR.

### KIESELGUHR.

*Synonyms.*—Infusorial Earth; Diatomaceous Earth.

Kieselguhr is a siliceous deposit formed chiefly of the frustules and fragmentary debris of diatoms—minute unicellular plants—which have accumulated in the depths of lacustrine districts. Immense beds from 40 to 50 feet deep occur in Virginia, also in Germany, Aberdeenshire, and elsewhere. Specimens from different localities vary considerably, not only in appearance but in the matters with which the diatomaceous residue is associated. In its natural state the deposit contains varying proportions of organic matter ( $\frac{1}{2}$  to 20 per cent.) as well as sand, clay, and iron oxide. For pharmaceutical use, it should be incinerated to destroy all organic matter, washed with hydrochloric acid, then with water, and dried. In this state it consists of practically pure silica.

It occurs as a white or slightly buff-coloured, fine, gritty powder, which is odourless, tasteless, and unaffected by all ordinary solvents. It should not char nor give off any unpleasant odour on ignition, and hydrochloric acid with which it has been shaken should leave no residue on evaporation. Under the microscope it is seen to consist of various forms of diatomaceous skeletons.

Kieselguhr is used similarly to white fullers earth in the preparation of absorbent and emollient dusting powders, usually with boric acid and zinc oxide or oleate. It is much employed as a basis for disinfectant powders and for dentifrices — powder or paste — containing carbolic or boric acid. Prepared with calcium carbonate, such preparations gradually undergo change, with formation of calcium phenate or borate, a disadvantage which may be obviated by the use of kieselguhr. It is a valuable absorbent for use as a pill excipient with volatile oils, liquefying mixtures (*e.g.*, menthol and carbolic acid), etc., the mass being prepared with hydrous wool fat or glycerin of tragacanth. Kieselguhr is also used as a filtering medium to clarify syrups and other liquids. For this purpose the powder should be triturated in a mortar with a little of the liquid before being added to the bulk of liquid to be filtered. It absorbs three times its weight of nitro-glycerin, and is used for that purpose in the manufacture of dynamite.

## KINO.

### KINO.

*Synonyms.*—East Indian Kino; Malabar or Cochin Kino.

Kino consists of the dried juice obtained from the trunk of *Pterocarpus Marsupium*, Roxb. (N.O. Leguminosæ), a tree growing in Southern India and Ceylon. The juice is contained in superposed wide ( $50\mu$  to  $100\mu$ ) cells in the bast. Vertical incisions, with oblique lateral ones running into them, are made in the bark of the tree; the thick, reddish juice that exudes, collected and dried, yields about half its weight of kino, which readily breaks up into small fragments. The juice is sometimes boiled before being evaporated.

The drug occurs in small, angular, glistening, brittle fragments, which appear to be almost black in colour, but the edges viewed by transmitted light are seen to be dark red and transparent. They break with a glassy fracture, and yield a brownish-red powder; the drug is, however, very free from dust. Partially soluble in water, more soluble (about 80 per cent.) in boiling water, and almost entirely soluble in alcohol when fresh. It has no odour, but an astringent taste, and tinges the saliva red, while adhering to the teeth when chewed.

The chief constituent of kino is kinotannic acid, of which it contains 70 to 80 per cent. It also contains kino red, a phlobaphene produced from kinotannic acid by oxidation, and small quantities of pyrocatechin (catechol), gallic acid, gum, etc. The presence of an oxydase causes oxidation of the kinotannic acid to proceed slowly in the drug, which gradually becomes duller in appearance; oxidation also takes place in aqueous and alcoholic solutions, the phlobaphene produced causing the liquids to gelatinise. As the activity of the enzyme is destroyed by heat, a tincture of kino which has been boiled will not

undergo gelatinisation, and it has been suggested that the freshly collected kino might with advantage be subjected to the action of heat. Recent researches have failed to confirm the presence in kino of a crystalline body, kinoin, previously reported by Etti. The proportion of kinotannic acid present in the drug has been variously stated, but appears in good fresh samples assayed by the hide powder process to range from 70 to 82 per cent., moisture varying from 12·2 to 15·7, and ash from 1·0 to 2·3. Other investigators, working on the commercial drug, have obtained less, the difference being probably due partly to variation in the mode of assay and partly to the gradual production of oxidation products intermediate between the soluble tannic acid and insoluble phlobaphene.

Kino is a powerful astringent used either externally or internally. It has the general properties of substances containing a large proportion of tannic acid (see *Acidum Tannicum*). For inflamed throat, *Trochisci Kino* are employed. The tincture is added to gargles (1 to 16); and, mixed with tincture of myrrh and diluted with water, it is used as an astringent wash for spongy gums. Internally, kino is given as *Pulvis Kino Compositus* in obstinate diarrhœa and dysentery, the powder being best given enclosed in a cachet. The tincture may be prescribed with bismuth salts or chalk mixture in diarrhœa. Powdered kino is used as an insufflation in epistaxis. Preparations of kino are incompatible with salts of iron and lead, lime water, mineral acids, alkalies, and gelatin.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

NOTES.—The term kino has been applied to a number of red astringent juices resembling the official Malabar or Cochin kino above described, but obtained from plants belonging to widely distant natural orders. The following are the most important:—1. African kino, from *Pterocarpus erinaceus*, Poir. 2. Botany Bay kino (see *Eucalypti Gummi* and *Kino Eucalypti*). 3. Butea kino (see *Butea Gummi*).

## KINO EUCALYPTI.

### EUCALYPTUS KINO.

*Synonym*.—Botany Bay Kino.

*Eucalyptus kino* is an exudation from the stems of various species of *Eucalyptus* (N.O. Myrtaceæ), natives of Australia. The drug is sometimes found in cavities in the trunk of the tree, where it has accumulated, or between the wood and the bark. Much is obtained by incision, the thick, treacly liquid that exudes being dried in the sun.

It occurs in irregular, dark red pieces, with a brittle fracture, the fractured surface being shiny. Partially soluble in water, and, when freed from mechanical impurities, entirely soluble in alcohol.

The composition of *eucalyptus kino* appears to vary considerably, according to the species from which it is obtained, but kino suitable for medicinal purposes should consist chiefly of non-gelatinisable tannic acid (? kinotannic acid), which gives a green colouration with ferric chloride. Other constituents which may be present are a tannin glucoside, an insoluble phlobaphene (kino red),



catechin, pyrocatechin (catechol), resin, and crystallisable bodies named eudesmin and aromadendrin. The tannin glucoside causes gelatinisation of tinctures prepared from kinos containing it, and is distinguished from the non-gelatinisable tannins by giving a violet colouration with ferric chloride.

Eucalyptus kino is official in the Australasian Colonies, for use in making the official preparations for which East Indian (Malabar, Cochin, or Madras) kino is directed to be used. Galenical preparations are made from eucalyptus kino, similar to those made from East Indian kino, and may be put to similar uses.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### KOLÆ SEMINA.

#### KOLA SEEDS.

*Synonyms.*—Cola Seeds ; Gooroo Nuts ; Bissy Nuts.

Kola seeds are obtained from *Cola vera*, Schumann (N.O. Sterculiaceæ), a large tree growing wild in Sierra Leone, North Ashanti, near the sources of the Niger, etc., and cultivated in West Africa as well as in the West Indies, Brazil, Java, etc. Several varieties of kola seeds, derived from different species of *Cola*, are known, but for medicinal use those derived from *Cola vera* are generally used, and should be preferred. West Africa and the West Indies supply the commercial drug. The fruit of the tree is a large, woody capsule, containing several large, white (or sometimes crimson) seeds. For exportation to Europe these are deprived of their seed-coats and dried, during which process they acquire a reddish-brown colour. Large quantities of the seeds are employed in their fresh state in Africa, where they are highly valued on account of their sustaining properties, and where they form a most important article of inland commerce.

The drug consists of the kernel of the seed, usually separated into its two cotyledons. These are from (2·5 to 5·0 centimetres long) plano-convex, and of a dull reddish-brown colour, but internally somewhat paler. They are easily cut with a knife and exhibit a perfectly uniform section. Fresh kola seeds have a bitterish, astringent taste, but this is lost during the drying, the dried seeds bring almost odourless and tasteless.

Kola seeds contain from 2 to 2·5 per cent. of caffeine, 0·3 per cent. of a crystalline glucoside, kolatin, and traces of theobromine. The tannin rapidly undergoes oxidation, the white (or crimson) colour of the fresh seeds soon changing to a reddish-brown, owing to the formation of kola red. This change can be obviated by boiling the fresh seeds, the oxidation being thus shown to be probably due to an oxydase. It has been asserted that the caffeine is present as a glucoside, kolanin, but this substance is probably a tannate of caffeine and theobromine. The seeds contain also starch, fatty matter, and sugar.

The properties of kola are virtually those of caffeine, modified slightly by the astringent matter present. The powdered drug is prepared in the form of chocolate and cocoa for their stimulating and sustaining properties; some proprietary cocoas, formerly much advertised as beverages, contained a certain proportion of kola. Pastilles of kola are prepared, and have a similar action. Liquid preparations are *Extractum Kolæ Liquidum*, *Tinctura Kolæ*, and *Vinum Kolæ*. The liquid extract is the more commonly used; it may be combined with liquid extract of coca in mixture form, as a stimulant to ward off fatigue, or with antipyrine for use against migraine. Such mixtures require the addition of mucilage to suspend resinous matters.

*Dose*.—1 to 3 grammes (15 to 45 grains).

NOTES.—Kola seeds with four cotyledons are occasionally seen on the market. They are the seeds of *Cola acuminata*, Schott and Endl., a tree growing in Cameroon and Congo, and are employed in the same way as the seeds of *Cola vera*, but are not so highly esteemed. Seeds with six cotyledons are also met with; these are derived from *C. Ballayi*, Cornu, and contain but little caffeine. Kolanin has been given in doses of 1 to 3 decigrams (2 to 5 grains).

## KRAMERIÆ RADIX.

KRAMERIA ROOT.

*Synonyms*.—Krameria; Rhatany Root.

Krameria root is obtained from *Krameria triandra*, Ruiz and Pavon (N.O. Polygalæ), a shrub growing on the mountain slopes of Peru and Bolivia (Peruvian rhatany), or from *Krameria argentea*, Mart., a plant growing in Brazil (Para rhatany).

Peruvian rhatany is usually about 3 centimetres or more in diameter, and knotty near the crown, but soon divides into a number of straight, dark reddish-brown, spreading branches, which have a scurfy, or, in the older pieces, rugged and scaly bark. These branches, cut into pieces of suitable length, constitute the bulk of the commercial drug. The fracture is splintery in the wood, but somewhat fibrous in the bark, which is also easily separable. A smoothed, transverse section exhibits a pale reddish wood surrounded by a darker bark, the thickness of the latter being equal to about one-sixth the diameter of the wood. Para rhatany occurs in long, nearly straight, cylindrical pieces, not usually exceeding 12 millimetres in thickness. They are dark purplish-brown in colour, and have a comparatively smooth or longitudinally wrinkled bark, exhibiting deep, transverse cracks, by which Para rhatany may readily be distinguished from Peruvian. The bark, which adheres firmly to the wood, is of a dark reddish-brown colour, and is about equal in thickness to one-half the diameter of the wood. Both varieties are odourless, but the bark has a very astringent taste.

The chief constituent of krameria root is about 8·4 per cent. of krameria-tannic acid, either variety containing about the same proportion. The root also contains a dark red phlobaphene (krameria red),

produced by the decomposition of the tannin, together with starch, etc. The drug yields about 2 per cent. of ash on incineration.

Krameria root is a powerful astringent, used both externally and internally, and has the general properties of tannic acid. The powdered root is added to tooth powders for use when the gums are spongy and inflamed. An infusion is used as a gargle for inflamed throats; the tincture may be diluted with 12 parts of water for a similar purpose, and to make a wash for use in inflamed gums or mercurial stomatitis. Extract of krameria is given in pills as an intestinal astringent; it may also be used in the form of suppository, with opium if necessary, for bleeding or prolapsed hæmorrhoids. Krameria is much used, with or without cocaine, in the form of a lozenge or pastille for sore throat. As an astringent injection for leucorrhœa or gonorrhœa, *Liquor Krameriaë Concentratus* may be diluted with 40 parts of water. Preparations of krameria are incompatible with metallic salts, alkalies, and gelatin.

*Dose.*—1 to 4 grammes (15 to 60 grains).

NOTES.—*Para rhatany* was formerly called *Savanilla rhatany*, but the latter, obtained from *K. tomentosa*, A. St. Hil., is seldom imported, has a paler colour, and its transverse section assumes a violet hue when moistened with solution of ferrous sulphate, while that of *Para rhatany* becomes bluish-black, and Peruvian greyish; in other respects *Savanilla rhatany* resembles the *Para* variety.

## LACCA.

LAC.

*Synonym.*—Shellac.

Lac is a resinous substance formed by a scale insect, *Tachardia Lacca*, R. Blanchard, also known as *Coccus Lacca*, Kerr (Class *Coccidæ*, Order Hemiptera), which lives on the juices of the stems of various plants. A resinous secretion forms around their bodies, and the twigs become encrusted. These encrusted twigs, collected from the trees during May, June, October, and November, are known as stick lac. The best known plants yielding it are *Butea frondosa*, Roxb.; *Ficus religiosa*, Linn.; *Schleichera trijuga*, Willd.; *Shorea robusta*, Gaertn.; *Zizyphus Jujuba*, Lam. But there are also plants specially grown for the purpose, including *Acacia arabica*, Willd., and *Cajanus indicus*, Spreng. The washed and dried lac is melted with a certain proportion of orpiment and resin, in bags of special cloth, through which it is pressed. This molten lac is placed on a surface heated by means of hot water, and spread into a sheet or skin about 3 millimetres in thickness. This is further stretched out, and so made to yield a very thin paper-like sheet shellac. It is then sorted according to colours. "Garnet lac," a dark-coloured variety, contains no arsenic as a rule, though it may have a high percentage of resin. Seed lac is stick lac which has been reduced to roundish pieces and washed. When dried it is mixed with yellow arsenic (orpiment), or resin, or both. The former is said to impart a rich straw colour to the shellac, but its action is probably only mechanical. Resin is added to lower the



melting-point, an essential condition for many industries, and it is frequently present to the extent of 2 to 5 per cent., few shellacs being entirely free from it. Most of the shellac of commerce comes from the neighbourhood of Mirzapore and Calcutta.

It occurs in thin fragments or scales, varying in size, and often somewhat curved, reddish-orange to red-brown in colour, transparent, hard and brittle, inodorous, and tasteless. The palest is the best, and is known as "orange" shellac. The darker varieties, known as "ruby," "garnet," etc., diminish in value in proportion to the depth of colour. Insoluble in water, but easily soluble in alcohol, especially on heating; soluble also in solution of potash, soda, and borax. Cold petroleum ether, free from water and alcohol, extracts only about 5 per cent., consisting chiefly of wax. Digested with ammonia in a closed vessel, shellac swells to a gelatinous mass.

The chief constituents of lac are about 6 per cent. of wax, up to 6 per cent. of a pigment named laccin, laccinic acid, 70 to 85 per cent. of resinous matter, 65 per cent. of which is insoluble in ether, and 35 per cent. soluble in ether containing alcohol. The part insoluble in ether is probably a resinotannol ester of aleuritic acid, while the ether-soluble portion includes a yellow colouring matter called erythrolaccin. Orpiment is rarely present to any appreciable extent. Resin is detected by dissolving the sample in alcohol, pouring the solution into water, collecting and drying the precipitate, triturating it with petroleum ether, filtering the liquid, and shaking the filtrate with a small quantity of water containing 0.1 per cent. of copper acetate; if resin be present the petroleum ether layer will show an emerald-green colour. The specific gravity is of no value as a means of determining purity of shellac. The iodine absorption is the most reliable test; the figure for genuine shellac lies between 4 and 10. Resin, on the other hand, has a fairly constant iodine value of 105 to 120.

Shellac is of importance in the arts, but is not used in medicine. It is the chief constituent of sealing-wax, and an important ingredient in many varnishes and polishes. It is used as a cement for joining broken porcelain, earthenware, etc. Bleached shellac is prepared by treating an alkaline solution with chlorine or sulphurous acid. On the addition of sulphuric acid it is obtained as a precipitate. This is collected, washed, "pulled" under water, and finally twisted into sticks and thrown into cold water. It has a yellowish-white colour and a silky lustre. It is readily soluble in alcohol or wood naphtha when freshly prepared, or when preserved under water, but becomes insoluble on exposure to the air. Liquid shellac,  $C_{46}H_{72}O_{12}$ , is formed by boiling shellac with solution of soda; on cooling, sulphuric acid is added, and the viscous liquid shellac precipitated can then be extracted with ether. It is a thick liquid, insoluble in water, but soluble in alcohol and in ether. It forms salts with lead, zinc, barium, magnesium, etc.; the magnesium salt is amorphous, very soluble in water, precipitated on boiling, but redissolved on cooling.

**LACTUCA.****LETTUCE.**

Lettuce is the fresh, flowering herb, *Lactuca virosa*, Linn. (N.O. Compositæ), a biennial plant, indigenous to and cultivated in Britain, as well as in Germany, France, etc.

The plant has a solid stem, 2 to 4 feet high, prickly near the base, branching above, and producing more or less leafy panicles of small, pale yellow flower-heads. The leaves are lanceolate to broadly oblong, sessile below, amplexicaul above, with coarsely toothed or more or less deeply lobed margin, and bearing stiff bristles or prickles on the under surface of the midrib, and lateral veins. The florets number six to twelve; the fruit is small, flattened, and bears a slender beak about as long as the fruit. Both leaves and stem exude when incised a copious, white, bitter latex, which is contained in an anastomosing system of laticiferous vessels in the bast.

In addition to the constituents of the latex, as described under Lactucarium, lettuce contains traces of hyoscyamine, to which the sedative action of the drug is probably due.

Lettuce is a mild sedative and hypnotic, and is used chiefly in irritable cough. Lozenges and pastilles are prepared containing 30 or 60 milligrams ( $\frac{1}{2}$  or 1 grain) of extract in each, sometimes combined with borax.

**LACTUCARIUM.****LACTUCARIUM.***Synonym.*—Lettuce Opium.

Lactucarium is the dried latex of *Lactuca virosa*, Linn., and other species of *Lactuca* (N.O. Compositæ). It is obtained by cutting off the upper portion of the stem, thus allowing the latex to exude, so that it can be transferred to a small cup. After twenty-four hours a thin slice is removed from the cut surface and the operation repeated. The collected latex soon solidifies, and is then removed from the cup, cut into pieces, and dried, gradually acquiring a dull brownish colour during the process.

The drug occurs in hard, opaque, irregular pieces, often curved on one side. They are dull brown in colour, but the interior, in recent pieces, may still be whitish and soft. The odour is characteristic, recalling that of opium; taste bitter. The cooled decoction should not be coloured blue by iodine.

One of the chief constituents of lactucarium is a colourless, tasteless, crystalline substance named lactucone (44 per cent.); this is accompanied by the bitter principles lactucin and lactucic acid, which are amorphous, and lactucopicrin, which is crystalline. Mannite, sugar, caoutchouc, etc., are also present, but the alkaloid hyoscyamine cannot be detected in lactucarium, although traces are contained in the fresh herb.

Lactucarium is employed as a sedative in irritable cough and as a mild hypnotic in insomnia. The syrup is much used abroad. Pastilles and lozenges containing lactucarium are prepared for local use against cough, 30 milligrams ( $\frac{1}{2}$  grain) in each.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

## LÆVULOSUM.

### LÆVULOSE.



*Synonyms.*—Diabetin ; Fructose.

Lævulose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , is frequently found in nature, accompanying grape sugar in fruits, and in honey. In some plants it is associated with cane sugar, and it is produced when inulin is boiled with a diluted mineral acid. It may be prepared by boiling a solution of cane sugar with diluted sulphuric acid ; hydrolysis occurs, and a mixture of equal parts of dextrose and lævulose, called "invert sugar," is obtained. Excess of acid is removed by treating with barium carbonate, and the liquid evaporated to a syrup. To obtain pure lævulose, the syrup is mixed with water, cooled in ice, and calcium hydroxide added to form a sparingly soluble calcium compound of lævulose. This is suspended in water, decomposed by carbon dioxide, the liquid filtered to remove calcium carbonate, and evaporated on a water-bath. The syrup obtained is washed with cold alcohol, and set aside in a cool place to crystallise, or it may be evaporated to dryness *in vacuo*.

The sugar occurs in fine, silky needles, or as a white, crystalline powder, or as a white, granular, crystalline, somewhat hygroscopic, mass. It is also met with as a thick syrup. The sugar is colourless and odourless, with a sweeter taste than cane sugar. Readily soluble in water and in diluted alcohol ; insoluble in absolute alcohol and in ether. The aqueous solution is neutral and lævorotatory. The anhydrous substance melts at about  $95^\circ$ . At  $170^\circ$  it is converted into lævulosan ( $\text{C}_6\text{H}_{10}\text{O}_5$ ), which is dextro-rotatory. On ignition it carbonises, and is ultimately consumed, leaving no residue. It reduces Fehling's solution and bismuth salts in alkaline solution. Succinic, acetic, and oxalic acids are among the products of oxidation when lævulose is treated with nitric acid.

Lævulose has greater sweetening power than cane sugar, and is more easily assimilated. It has been recommended for use in such wasting diseases as phthisis, large quantities—120 to 240 grammes (4 to 8 ounces)—being given daily with tincture of quassia or other bitter. Lævulose, like other lævo-rotatory carbohydrates, is sometimes found to be assimilated by diabetics when the usual carbohydrate foods increase the excretion of sugar in the urine and are therefore inadmissible. It is used in place of cane sugar as a sweetening agent in diabetic cookery. It is also recommended for administration to tuberculous and scrofulous children in place of milk sugar or cane sugar.



**LAMELLÆ.****DISCS.***Synonym.*—Eye Discs.

Discs are cut or stamped out of thin sheets or films, prepared with a glycerinated gelatin basis, and contain definite quantities of various medicaments, for use in eye-treatment, a disc being placed with a small camel-hair brush on the inner surface of the lower lid, where it almost immediately dissolves in the lachrymal secretion. The gelatin basis from which the discs are made is prepared as follows:—

Gelatin ...	...	...	...	...	...	16.50
Glycerin ...	...	...	...	...	...	1.25
Distilled Water ...	...	...	...	...	...	82.25

Boil and cool the distilled water, add the glycerin, and allow the gelatin to soak in the mixture until softened; then heat gently until solution is effected, and strain through muslin. The basis thus obtained is medicated by melting 5 grammes (80 grains) of it, and adding a solution of the required medicament in the smallest possible quantity of recently boiled and cooled distilled water. The medicated gelatin is then poured upon a sheet of plate glass, which has been coated thinly with white beeswax, and heated to about 38°, the film being confined by means of a shape cut out of thick writing paper, so as to cover a surface about 100 millimetres (4 inches) square. When solidified, the film is allowed to dry upon the glass, after which it is detached and cut into discs, about  $3\frac{1}{2}$  millimetres ( $\frac{1}{7}$  inch) in diameter, by means of a suitable punch.

NOTE.—Eye discs should be prepared and kept in an aseptic atmosphere.

**LAMELLÆ ATROPINÆ.****ATROPINE DISCS.**

Atropine Sulphate ...	13 milligrams	( $\frac{1}{5}$ grain)
Distilled Water, a sufficient quantity.		
Gelatin Basis ...	75 decigrams	(115 grains)

Dissolve the atropine sulphate in the water, add the gelatin basis, make a film about 100 millimetres (4 inches) square, and cut it into discs, each of which should weigh about  $1\frac{1}{4}$  milligrams ( $\frac{1}{50}$  grain) and contain 0.013 milligram ( $\frac{1}{5000}$  grain) of atropine sulphate.

These discs are used to dilate the pupil, for which purpose stronger discs, containing  $\frac{1}{2000}$  or  $\frac{1}{1000}$  grain of atropine sulphate in each, are also employed. Much stronger discs, containing  $\frac{1}{500}$  or  $\frac{1}{250}$  grain of atropine sulphate in each, are used to paralyse the accommodation.

**LAMELLÆ COCAINÆ.****COCAINE DISCS.**

Cocaine Hydrochloride ...	13 decigrams	(20 grains)
Distilled Water, a sufficient quantity.		
Gelatin Basis ...	5 grammes	(77 grains)

Dissolve the cocaine hydrochloride in the water, add the gelatin basis, make a film about 100 millimetres (4 inches) square, and cut it into discs, each of which should weigh about 2 milligrams ( $\frac{1}{30}$  grain) and contain 1.3 milligrams ( $\frac{1}{50}$  grain) of cocaine hydrochloride.

These discs are used to allay pain. Weaker discs, containing  $\frac{1}{100}$  or  $\frac{1}{200}$  grain in each, are also prepared.

### LAMELLÆ HOMATROPINÆ.

#### HOMATROPINE DISCS.

Homatropine Hydrobromide... 65 centigrams (10 grains)

Distilled Water, a sufficient quantity.

Gelatin Basis ... 4 grammes (60 grains)

Dissolve the homatropine hydrobromide in the water, add the gelatin basis, make into a film about 100 millimetres (4 inches) square, and cut it into discs, each of which should weigh about  $1\frac{1}{4}$  milligrams ( $\frac{1}{50}$  grain) and contain 0.65 milligram ( $\frac{1}{100}$  grain) of homatropine hydrobromide.

These discs are used to dilate the pupil. Weaker discs, containing  $\frac{1}{5000}$  grain in each, are also prepared.

### LAMELLÆ PHYSOSTIGMINÆ.

#### PHYSOSTIGMINE DISCS.

*Synonyms.*—Lamellæ Eserinæ; Eserine Discs.

Physostigmine Sulphate ... 65 milligrams (1 grain)

Distilled Water, a sufficient quantity.

Gelatin Basis ... 71 decigrams (110 grains)

Dissolve the physostigmine sulphate in the water, add the gelatin basis, make a film about 100 millimetres (4 inches) square, and cut it into discs, each of which should weigh about  $1\frac{1}{4}$  milligrams ( $\frac{1}{50}$  grain) and contain 0.065 milligram ( $\frac{1}{1000}$  grain) of physostigmine sulphate.

These discs are used to diminish intra-ocular pressure as in glaucoma, and to contract the pupil. Stronger discs, containing  $\frac{1}{250}$  or  $\frac{1}{500}$  grain, are also prepared.

### LARICIS CORTEX.

#### LARCH BARK.

Larch bark is obtained from *Larix europæa*, DC. (N.O. Coniferæ), a large tree indigenous to Southern and Central Europe, but cultivated in Britain. The bark is stripped from the trunk and branches, and dried.

The bark occurs usually in flat, curved, or channelled pieces, less frequently in large quills. The outer portion (often largely developed) consists of dark brown fissured outer bark, from which large flakes can easily be split off disclosing a rose-coloured surface.

Inner portion narrow and whitish. The longitudinal section exhibits very large spindle-shaped sclerenchymatous cells, and long narrow cells containing small prismatic crystals of calcium oxalate embedded in a dark brown amorphous mass. The bark has a terebinthinate odour and astringent terebinthinate taste.

The chief constituent of larch bark is tannin, but it also contains a crystalline bitter principle larixin (larixinic acid), which appears to be allied to pyrocatechin. Larixin is said to be most abundant in the young bark.

Larch bark is astringent and diuretic. The tincture is used internally as a stimulating expectorant in chronic bronchitis. Diluted with 20 to 30 parts of water it forms an astringent injection to arrest chronic mucous discharges.

NOTES. — Young bark, or older bark deprived of its outer portion, is better than the thick old bark usually in commerce, but can seldom be procured. Venice turpentine is the viscid yellowish liquid that exudes when holes are bored in the trunk of *Larix europæa*. It is entirely soluble in absolute alcohol, and does not readily harden on exposure or when mixed with one-sixteenth of its weight of magnesia. It yields about 15 per cent. of volatile oil resembling turpentine. The Venice turpentine of commerce is often a factitious substance prepared by dissolving resin in oil of turpentine; it is darker in colour than the genuine substance. Venice Turpentine is used in veterinary practice (see *Terebinthina Veneta Factitia*).

## LAURI FRUCTUS.

### LAUREL BERRIES.

*Synonym.*—Bay Berries.

Laurel berries are the ripe fruits of the bay laurel, *Laurus nobilis*, Linn. (N.O. Laurineæ), a small evergreen tree universally cultivated in Europe.

They are one-celled, one-seeded, ovoid, drupaceous fruits, about 12 millimetres in length, with a dark purple or nearly black, thin, brittle, wrinkled pericarp, which when broken discloses the kernel of the seed, the seed-coats adhering to the inner surface of the pericarp. The kernel is yellowish or brownish in colour, and lies loose in the cavity of the fruit; it is easily split into two large plano-convex cotyledons. The kernel has an aromatic bitter taste, the pericarp being less aromatic but more bitter.

Laurel berries contain about 30 per cent. of fat, 1 per cent. of volatile oil, together with starch, proteids, etc. The bitter principle has not yet been isolated. The fat consists chiefly of laurostearin (glyceryl laurate); the volatile oil, which is more viscid and less aromatic than that from the leaves, contains cineol, together with a sesquiterpene and a little pinene, geraniol, and eugenol.

The volatile oil is used in preparations for external use on account of its pleasant odour. The fixed oil has been used for rubbing, in rheumatism, but is now almost obsolete.

NOTES. — Expressed oil of bay (*Oleum Lauri Expressum*) is obtained in Greece and Northern Italy by steaming or boiling the fruits and expressing the oil; it



solidifies when cold to a granular green mass, with aromatic odour and taste. Lard or other fatty basis, coloured green and made aromatic with the volatile oil, is sometimes substituted for the expressed oil, but is smoother.

## LAUROCERASI FOLIA.

### CHERRY-LAUREL LEAVES.

Cherry-laurel leaves are obtained from *Prunus Laurocerasus*, Linn. (N.O. Rosaceæ), an evergreen shrub indigenous to Persia and Asia Minor, but cultivated in temperate regions. They are used in the fresh state.

The leaves are alternate, shortly petiolate and coriaceous in texture. They vary usually from 12 to 17 centimetres in length, and from 4 to 5 centimetres in breadth. They are oblong or nearly obovate in shape and taper towards both base and apex, the latter being acute and somewhat recurved. The margin bears strong, distant serrations. The upper surface is dark green and glossy, the lower paler with prominent midrib, near the base of which on either side are from two to four sugar glands. The leaves are inodorous, but when bruised emit an odour of hydrocyanic acid and bitter almond oil.

The chief constituent of cherry-laurel leaves is a glucoside laurocerasin (prulaurasin) which has been obtained in long, slender, acicular, bitter crystals, melting at  $120^{\circ}$  to  $122^{\circ}$ ; it closely resembles amygdalin, but is not identical with it. It is contained in the parenchymatous tissue of the leaf, whereas the endodermis of the midrib and veins contains an enzyme (emulsin) capable of hydrolysing it; when, therefore, the respective cells containing these constituents are ruptured the emulsin coming into contact with the laurocerasin decomposes it, giving rise to dextrose, hydrocyanic acid, and benzaldehyde. The leaves yield on an average about 0.1 per cent. of hydrocyanic acid; young leaves yield more than old ones, and unexpanded leaves may yield as much as 2.4 per cent.

Cherry-laurel leaves are used in pharmacy only for the preparation of Aqua Laurocerasi, a distilled aromatic water containing 0.1 per cent. of hydrocyanic acid.

## LEPTANDRA.

### LEPTANDRA.

#### *Synonym.*—Culver's Root.

Leptandra consists of the dried rhizome and roots of *Veronica virginica*, Linn., also known as *Leptandra virginica*, Nutt. (N.O. Scrophularineæ), a tall perennial herb, abundant in Eastern and Central North America.

The rhizome is horizontal or oblique, dark greyish-brown in colour, 10 to 15 centimetres long and about 5 millimetres thick. It is terminated by the remains of the aerial stem, and bears such remains at distant intervals. The numerous wiry roots are attached

to the under surface, the upper surface bearing small, brown cataphyllary leaves. The rhizome is hard and woody, a transverse section exhibiting a narrow, dark cortex, a paler ring of wood of about equal thickness, and a large, dark pith or sometimes a partly hollow centre. The drug is inodorous, with an unpleasantly bitter and slightly acrid taste.

The rhizome contains the glucoside leptandrin, which crystallises in bitter, yellowish needles, about 6 per cent. of resin, together with a little saponin, volatile oil, tannin, glucose, etc. Leptandrin is soluble in alcohol, ether, benzene, and boiling water. Continued heating with diluted mineral acids converts it into a dark, resinous substance.

Leptandra is a reputed cholagogue, promoting the flow of bile without irritating the intestine. It has been specially recommended in duodenal indigestion and chronic constipation. Its action appears to be due to the glucoside leptandrin, but leptandra is used chiefly, in this country, in the form of the resinoid, incorrectly named "leptandrin," which is a constituent of many American nostrums. It is prepared by pouring a concentrated tincture of leptandra into water, washing the precipitated resinoid with more water, then drying and powdering it. The product is dark green or greenish-brown in colour, soluble in alcohol, and tasteless when pure, but it is usually somewhat bitter, owing to the presence of traces of true leptandrin, to which must be attributed any effects produced by the otherwise inert resin and by the drug itself.

*Dose.*—1 to 4 grammes (15 to 60 grains).

*NOTES.*—The fresh rhizome is violently cathartic and emetic, but these properties are less pronounced in the dried drug. It should be kept for a year before it is used. The resinoid "leptandrin" is used in pill form with other so-called "cholagogues or liver stimulants," and is the preparation usually intended when "leptandrin" is ordered in prescriptions. It is most frequently combined with podophyllin or euonymin, extract of henbane or belladonna being added to prevent griping. Dose, 1 to 3 decigrams (2 to 5 grains). Fluidextractum Leptandræ, U.S.P., is prepared by exhausting leptandra, in No. 60 powder, by percolation with 71 per cent. alcohol, and adjusting the strength of the product so that 1 part by volume is equivalent to 1 part of the drug. Average dose, 1 mil (15 minims). Extractum Leptandræ, U.S.P., is prepared by evaporating 100 of the liquid extract to dryness, at a temperature not exceeding 70°, powdering the residue, and adding sufficient powdered liquorice to make the product weigh 25. Average dose, 25 milligrams (4 grains).

## LIGROINUM.

### LIGROIN.

*Synonym.*—Petroleum Naphtha.

Ligroin is a mixture of certain constituents of petroleum, or rock oil, separated by fractional distillation, and consisting chiefly of heptane,  $C_7H_{16}$ , and octane,  $C_8H_{18}$ . It is similar to petroleum ether, but has a higher boiling-point.

It occurs as a colourless liquid. Boiling-point, 90° to 120°; specific gravity, 0.707 to 0.722.

Ligroin is used chiefly as a solvent of fats, oils, and resins.

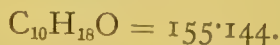
**LIMONIS CORTEX.****LEMON PEEL.**

Lemon peel consists of the fresh outer part of the pericarp of the fruit of *Citrus Medica*, Linn., var.  $\beta$ -*Limonum*, Hook. f. (N.O. Rutaceæ), a small tree cultivated in the countries bordering the Mediterranean. The lemons are gathered when green, afterwards ripening and becoming yellow in colour.

The peel, which is official in the fresh state only, is pale yellow in colour, and more or less rough on the outer surface; the inner surface should have very little of the white spongy portion of the mesocarp adhering to it. A transverse section shows numerous large oil-glands near the epidermis. The odour of the peel is strong, fragrant, characteristic; its taste is aromatic and bitter. Lemon peel may be distinguished from orange peel by its paler colour and different aroma, as well as by the fact that when moistened with strong hydrochloric acid it remains unchanged or becomes yellowish-brown, whereas orange peel becomes dark green in colour.

Lemon peel contains volatile oil and hesperidin. It is a bitter stomachic and tonic, but is used to impart flavour rather than for these properties. Tincture of lemon may be used to flavour either acid or alkaline mixtures.

NOTE.—Dried lemon peel may be used in India and the Colonies, in making official preparations for which fresh lemon peel is directed to be used, when the fresh peel cannot be obtained.

**LINALOOL.****LINALOOL.**

Linalool,  $C_{10}H_{18}O$ , is an unsaturated alcohol, isomeric with geraniol. It occurs in a large number of essential oils, such as oils of coriander, lignaloe, bergamot, spike lavender, thyme, etc., and may be either lævo- or dextro-rotatory. It is obtained by fractional distillation of the oils, which have previously been saponified, and also in the inactive state by treating the chloride produced by the action of hydrochloric acid on geraniol, with alcoholic potash.

It occurs as a fragrant, colourless liquid. Specific gravity, 0.870 to 0.875. Boiling-point,  $197^{\circ}$  to  $199^{\circ}$ . Refractive index, 1.4611. Rotation, about  $20^{\circ}$  in either direction. On oxidation with potassium bichromate and sulphuric acid, linalool yields the aldehyde of geraniol, geranialdehyde or citral. The acetate derived from linalool by heating with acetic anhydride is also contained in oil of bergamot, which owes its odour to this ester. Linalyl acetate,  $C_{10}H_{17}OC_2H_3O$ , is lævo-rotatory, and has a specific gravity of 0.912; boiling-point,  $105^{\circ}$ . When linalool is reduced with sodium and absolute alcohol, or with zinc dust in a sealed tube, at about  $220^{\circ}$  to  $230^{\circ}$ , it yields linalolene,  $C_{10}H_{18}$ .

NOTE.—Oil of coriander consists almost entirely of d-linalool (coriandrol).



**LINCTUS ACETOMORPHINÆ.**

## LINCTUS OF ACETOMORPHINE.

Acetomorphine Hydrochloride	...	...	0·10
Tincture of Hyoscyamus	...	...	7·50
Spirit of Chloroform	...	...	7·50
Syrup of Balsam of Tolu	...	...	15·00
Syrup of Wild Cherry	...	...	15·00
Glycerin, sufficient to produce	...	...	100·00

Dissolve the acetomorphine in the tincture and spirit; mix with the syrups, and add sufficient glycerin to produce the required volume.

This is a useful linctus for coughs, bronchitis, laryngitis, and asthmatic conditions.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTE.*—This preparation contains about  $\frac{1}{18}$  grain of acetomorphine hydrochloride in 1 fluid drachm.

**LINCTUS CODEINÆ.**

## LINCTUS OF CODEINE.

Syrup of Codeine	...	...	...	50·00
Citric Acid	...	...	...	1·75
Emulsion of Chloroform	...	...	...	5·00
Glycerin	...	...	...	16·50
Mucilage of Tragacanth, sufficient to produce	...	...	...	100·00

Dissolve the citric acid in the syrup of codeine; then add the glycerin, emulsion of chloroform, and sufficient mucilage of tragacanth to make up the required volume.

Linctus of codeine is a soothing preparation for coughs, especially in phthisis; it stops the cough without depressing the medulla to the same extent as morphine.

*Dose.*—4 mils (1 fluid drachm).

*NOTE.*—This preparation contains about  $\frac{1}{8}$  grain of codeine phosphate in 1 fluid drachm.

**LINCTUS IPECACUANHÆ.**

## LINCTUS OF IPECACUANHA.

Vinegar of Ipecacuanha	...	...	...	25·00
Syrup of Balsam of Tolu	...	...	...	25·00
Glycerin	...	...	...	25·00
Mucilage of Tragacanth, sufficient to produce	...	...	...	100·00

Mix the liquids.

This preparation is used as a cough linctus for children, especially in whooping-cough and croup.

*Dose.*—4 mils (1 fluid drachm).

**LINCTUS SCILLÆ.**

LINCTUS OF SQUILL.

*Synonyms.*—Linctus; Simple Linctus.

Oxymel of Squill	...	...	...	25'00
Mucilage of Tragacanth	...	...	...	25'00
Glycerin...	...	...	...	25'00
Emulsion of Chloroform	...	...	...	5'00
Syrup, sufficient to produce	...	...	...	100'00

Mix the liquids.

This preparation is used as a cough linctus for children.

*Dose.*—4 mils (1 fluid drachm).

NOTES.—Linctus Opiatus is prepared by adding 1 of tincture of opium to 29 of this linctus (2 minims in 1 fluid drachm). Linctus Scillæ Compositus (or Opiatus) is a mixture of equal parts of compound tincture of camphor, oxymel of squill, and syrup of tolu. Dose, 4 mils (1 fluid drachm).

**LINCTUS SEDATIVUS.**

SEDATIVE LINCTUS.

*Synonym.*—Linctus Morphinæ Acidus.

Solution of Morphine Hydrochloride...	...	...	5'00
Spirit of Chloroform	...	...	5'00
Lemon Juice	...	...	25'00
Glycerin, sufficient to produce	...	...	100'00

Mix the liquids.

This preparation is a cough linctus for the use of adults; it should not be given to children.

*Dose.*—4 mils (1 fluid drachm).

NOTE.—This linctus contains about  $\frac{1}{32}$  grain of morphine hydrochloride in 1 fluid drachm.

**LINIMENTUM ACONITI.**

LINIMENT OF ACONITE.

Aconite Root, in No. 40 powder	...	...	66'66
Camphor	...	...	3'33
Alcohol, sufficient to produce	...	...	100'00

Macerate the powdered root with 70 of the alcohol for three days, with occasional agitation; then transfer to a percolator, and percolate with more of the alcohol, allowing the liquid to drop upon the camphor until the latter is dissolved and the product measures 100.

Liniment of aconite is employed as an anodyne in chronic rheumatism, neuralgia, and sciatica. It may be painted on with a camel-hair brush, or diluted with soap liniment and rubbed on with the finger, or applied on impermeable piline. Preparations of aconite should not be used on abraded surfaces, on account of the danger of absorption. All preparations of aconitine must be used with great care, because of the extremely poisonous nature of the alkaloid.

**LINIMENTUM ACONITI COMPOSITA.**

COMPOUND LINIMENT OF ACONITE.

*Synonym.*—A.B.C. Liniment.

Liniment of Aconite	...	...	...	...	40'00
Liniment of Belladonna	...	...	...	...	40'00
Chloroform	...	...	...	...	20'00

Mix the liniments with the chloroform.

This is an improvement upon the forms of A.B.C. liniment containing oil. Its properties and methods of use are similar to those of *Linimentum Aconiti*.

**LINIMENTUM ACONITI ET CHLOROFORMI.**

LINIMENT OF ACONITE AND CHLOROFORM.

Chloroform	...	...	...	...	12'50
Liniment of Aconite, sufficient to produce	...	...	...	...	100'00

Mix the liquids.

The properties of this liniment and its methods of use are similar to those of *Linimentum Aconiti*.

**LINIMENTUM ÆRUGINIS.**

LINIMENT OF VERDIGRIS.

*Synonyms.*—Mel *Ægyptiacus*; Unguentum *Ægyptiacum*; Oxymel *Æruginis*.

Verdigris	...	...	...	...	...	4'50
Vinegar	...	...	...	...	...	32'00
Honey	...	...	...	...	...	63'50

Dissolve the verdigris in the vinegar, then add the honey, and boil down to a proper consistence.

Liniment of verdigris is applied undiluted or mixed with an equal quantity of simple ointment to indolent ulcers; it is now seldom used except in veterinary medicine.

NOTE.—*Linimentum Æruginis* was official in the London Pharmacopœia, 1851.

**LINIMENTUM ALBUM.**

WHITE LINIMENT.

*Synonym.*—Egg Liniment.

Acetic Acid	...	...	...	...	...	8'50
Oil of Lemon	...	...	...	...	...	1'50
Oil of Turpentine	...	...	...	...	...	40'00
Yolk and White of Egg, by volume	...	...	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Emulsify the turpentine and oil of lemon with the egg, gradually add a portion of the distilled water, and finally the acetic acid previously diluted with distilled water.

This is a stimulating and rubefacient liniment for use with friction in sprains, muscular rheumatism, and where counter-irritation is desired.



**LINIMENTUM AMMONIÆ.**

LINIMENT OF AMMONIA.

*Synonym.*—Hartshorn and Oil.

Solution of Ammonia	...	...	...	...	25·00
Almond Oil	...	...	...	...	25·00
Olive Oil	...	...	...	...	50·00

Mix the solution of ammonia with the oils by shaking them together.

This liniment is used as a rubefacient and counter-irritant application for lumbago, joint troubles, muscular pains, and in bronchitis.

NOTES.—This liniment thickens on keeping. A more satisfactory and permanent emulsion is obtained by using cotton seed oil in place of almond and olive oils. Linimentum Ammoniæ, U.S.P., is prepared by mixing freshly, as required, 35 of solution of ammonia, 5 of alcohol (95 per cent.), 57 of cotton seed oil, and 3 of oleic acid.

**LINIMENTUM ARNICÆ.**

LINIMENT OF ARNICA.

*Synonym.*—Arnica Opodeldoc.

Hard Soap	...	...	...	...	20·00
Alcohol	...	...	...	...	50·00
Tincture of Arnica	...	...	...	...	25·00
Camphor	...	...	...	...	5·00

Dissolve the camphor in the alcohol and tincture of arnica, add the soap, warm on a water-bath till dissolved, taking care to avoid loss of alcohol, then pour into suitable bottles, and cool.

Liniment of arnica is applied with friction as a mild counter-irritant.

**LINIMENTUM ATROPINÆ.**

LINIMENT OF ATROPINE.

Atropine Sulphate	...	...	...	...	0·40
Compound Tincture of Lavender	...	...	...	...	1·00
Alcohol, sufficient to produce	...	...	...	...	100·00

Dissolve the atropine sulphate in the alcohol, and add the compound tincture of lavender.

This liniment does not stain the skin or clothes of the patient, and has nearly the same alkaloidal strength as Linimentum Belladonnæ, for which it is a cleanly substitute.

**LINIMENTUM ATROPINÆ CUM CHLOROFORMO.**

LINIMENT OF ATROPINE WITH CHLOROFORM.

Chloroform	...	...	...	...	12·50
Atropine Liniment, sufficient to produce	...	...	...	...	100·00

Mix the chloroform with the atropine liniment.

This liniment does not stain the skin or clothes of the patient, and has nearly the same alkaloidal strength as Linimentum Belladonnæ et Chloroformi, for which it is a cleanly substitute.

### LINIMENTUM BELLADONNÆ.

#### LINIMENT OF BELLADONNA.

Liquid Extract of Belladonna	...	...	50·00
Camphor	...	...	5·00
Distilled Water...	...	...	10·00
Alcohol, sufficient to produce	...	...	100·00

Add the liquid extract of belladonna and the distilled water to a solution of the camphor in 30 of alcohol, make up to the required volume by the addition of more alcohol, and filter after allowing to stand for twenty-four hours.

Liniment of belladonna is used as an anodyne application for lumbago, neurægia, and rheumatic pains. Diluted with an equal quantity of soap liniment or compound camphor liniment it is rubbed over the painful part or applied on impermeable piline.

NOTE.—Linimentum Belladonnæ, U.S.P., is prepared by dissolving 5 of camphor in sufficient Fluidextractum Belladonnæ Radicis to produce 100 by volume.

### LINIMENTUM BELLADONNÆ CUM CHLOROFORMO.

#### LINIMENT OF BELLADONNA WITH CHLOROFORM.

Chloroform	...	...	12·50
Liniment of Belladonna, sufficient to produce	...	...	100·00

Mix the liquids.

Liniment of belladonna and chloroform is specially suitable for close application to the skin on flannel or piline to remove neuralgic pain. Menthol (1 in 16) is sometimes added.

### LINIMENTUM BETULÆ COMPOSITUM.

#### COMPOUND LINIMENT OF BIRCH.

*Synonym.*—Liniment of Methyl Salicylate.

Menthol	...	...	5·00
Oil of Eucalyptus	...	...	10·00
Essential Oil of Camphor	...	...	25·00
Methyl Salicylate, sufficient to produce	...	...	100·00

Dissolve the menthol in the liquids.

This liniment is miscible with either spirit or oil, and is used to paint over rheumatic joints or neuralgic areas, the parts being covered subsequently with flannel or gutta-percha tissue. It has been found of great value in the treatment of lumbago, sciatica, and the like.

**LINIMENTUM CALAMINÆ.**

## LINIMENT OF CALAMINE.

Prepared Calamine	...	...	...	...	4'50
Zinc Oxide	...	...	...	...	3'50
Solution of Lime	...	...	...	...	50'00
Olive Oil, sufficient to produce	...	...	...	...	100'00

Mix the powders with the solution of lime in a mortar, and, when a smooth cream is obtained, add the whole of the oil at once, and stir together.

Liniment of calamine is a soothing application in eczema and irritable conditions of the skin, and may be used in place of carron oil for burns.

**LINIMENTUM CALCIS.**

## LINIMENT OF LIME.

Solution of Lime	...	...	...	...	50'00
Olive Oil	...	...	...	...	50'00

Mix the solution of lime with the olive oil, by shaking them together.

Liniment of lime is a mild sedative and astringent. It is applied on lint or soft linen to burns and scalds.

NOTE.—Linimentum Calcis, U.S.P., consists of equal volumes of lime water and linseed oil.

**LINIMENTUM CALCIS CUM OLEO LINI.**

## LINIMENT OF LIME WITH LINSEED OIL.

*Synonyms.*—Lime Water and Oil; Carron Oil.

Linseed Oil	...	...	...	...	50'00
Lime Water	...	...	...	...	50'00

Shake well to form a cream.

This liniment is used as an application for burns or scalds; it should be applied on lint or soft linen.

NOTE.—This preparation corresponds to Linimentum Calcis, U.S.P.

**LINIMENTUM CAMPHORÆ.**

## LINIMENT OF CAMPHOR.

*Synonym.*—Camphorated Oil.

Camphor, in flowers, recently sifted	...	...	...	...	20'00
Olive Oil	...	...	...	...	80'00

Add the camphor to the oil and shake frequently until dissolved, taking care to avoid loss of camphor by evaporation if heat be applied.

Liniment of camphor is a stimulant and rubefacient application, and is used as a counter-irritant to rub the chest in the bronchitis of children, or for rubbing on painful joints. It is used as a hypodermic injection in collapse, 5 mils (90 minims) being mixed with an equal quantity of olive oil for this purpose. Liniment of camphor is an excellent antidote for carbolic acid poisoning.

NOTE.—Linimentum Camphoræ, U.S.P., is prepared by dissolving 20 of camphor in sufficient cotton seed oil to produce 100 by weight.



**LINIMENTUM CAMPHORÆ AMMONIATUM.**

AMMONIATED LINIMENT OF CAMPHOR.

*Synonyms.*—Linimentum Camphoræ Compositum; Compound Liniment of Camphor.

Camphor	...	...	...	...	12'50
Oil of Lavender	...	...	...	...	0'625
Strong Solution of Ammonia	...	...	...	...	25'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Add the solution of ammonia to a solution of the camphor and oil of lavender in 60 of the alcohol, gradually, and with constant agitation, then add sufficient alcohol to make up the required volume, and shake well together until a clear solution is obtained.

This liniment is a powerful counter-irritant for use in chronic rheumatism, neuralgia, etc. The ammonia is the most active constituent.

**LINIMENTUM CAPSICI.**

LINIMENT OF CAPSICUM.

Stronger Tincture of Capsicum	...	...	...	35'00
Oleic Acid	...	...	...	12'50
Oil of Lavender	...	...	...	0'625
Alcohol, sufficient to produce	...	...	...	100'00

Mix the tincture of capsicum with 50 of the alcohol, add the oleic acid and the oil of lavender, and make up to the required volume with more alcohol.

Liniment of capsicum is rubefacient and counter-irritant, and is used in chest affections, rheumatism, lumbago, and sciatica. It is applied on flannel over the larynx to relieve laryngitis and loss of voice. A mixture of equal quantities of Linimentum Capsici, Linimentum Camphoræ Ammoniatum, and Linimentum Belladonnæ form an excellent application for unbroken chilblains.

**LINIMENTUM CAPSICI COMPOSITUM.**

COMPOUND LINIMENT OF CAPSICUM.

*Synonyms.*—Liquor Capsici Compositus; Compound Solution of Capsicum.

Black Pepper, in powder	...	...	...	10'00
Capsicum, in powder	...	...	...	10'00
Hard Soap	...	...	...	2'50
Camphor	...	...	...	2'50
Oil of Rosemary	...	...	...	0'50
Oil of Lavender	...	...	...	0'50
Oil of Cloves	...	...	...	0'50
Oil of Cinnamon	...	...	...	0'10
Solution of Ammonia	...	...	...	20'00
Alcohol, sufficient to produce	...	...	...	100'00

Macerate the pepper, capsicum, soap, and camphor with 65 of

alcohol for eight days; express, add the volatile oils and solution of ammonia, and sufficient alcohol to produce 100.

Compound liniment of capsicum is a rubefacient and counter-irritant, similar in its properties to Linimentum Capsici.

NOTE.—This preparation closely resembles the Linimentum Capsici Compositum of the Austrian Pharmacopœia.

## LINIMENTUM CHLOROFORMI.

### LINIMENT OF CHLOROFORM.

Chloroform	...	...	...	...	50'00
Liniment of Camphor	...	...	...	...	50'00

Mix the chloroform with the liniment of chloroform, by shaking them together.

Liniment of chloroform is a sedative application in rheumatism and neuralgia, but is preceded by a stimulant action.

NOTE.—Linimentum Chloroformi, U.S.P., is prepared by mixing 30 of chloroform with 70 of soap liniment.

## LINIMENTUM CROTONIS.

### LINIMENT OF CROTON OIL.

Croton Oil	...	...	...	...	12'50
Oil of Cajuput	...	...	...	...	43'75
Alcohol	...	...	...	...	43'75

Mix the oils with the alcohol, by shaking them together.

This liniment has been applied as a powerful counter-irritant in acute laryngitis, phthisis, bronchitis, and joint troubles, but is now seldom used on account of the painful inflammation that may be produced.

## LINIMENTUM HYDRARGYRI.

### LINIMENT OF MERCURY.

Ointment of Mercury	...	...	...	...	33'00
Strong Solution of Ammonia	...	...	...	...	11'00
Liniment of Camphor, a sufficient quantity.					

Mix the solution of ammonia with sufficient liniment of camphor to produce 49·5 by volume, and add the ointment of mercury previously mixed with sufficient liniment of camphor to produce 49·5 by volume.

Liniment of mercury is a stimulating application used as an absorbent to swollen joints and enlarged glands. In tuberculous peritonitis it is spread on an abdominal binder, or rubbed into the abdominal walls. The mercury is absorbed through the skin, and it may be used in the treatment of syphilis.

NOTE.—The following process has been suggested, as yielding a more satisfactory preparation than the above :—Mix  $27\frac{1}{2}$  of solution of ammonia with twice its volume of liniment of camphor, and triturate 33 of ointment of mercury with the mixture. The product measures 99.

**LINIMENTUM MENTHOLIS.**

## LINIMENT OF MENTHOL.

Menthol ...	...	...	...	...	20'00
Chloroform ...	...	...	...	...	25'00
Olive Oil, sufficient to produce	...	...	...	...	100'00

Mix the menthol with the chloroform, and add the olive oil.

Liniment of menthol is painted on the skin or applied on lint for neuralgia, sciatica, and lumbago.

**LINIMENTUM OPII.**

## LINIMENT OF OPIUM.

Tincture of Opium	...	...	...	...	50'00
Liniment of Soap	...	...	...	...	50'00

Mix the tincture with the liniment, and filter, after allowing to stand for a few days.

Liniment of opium is used as an anodyne application for rubbing painful joints, sprains, and contusions. It should not, however, be forgotten that there is no reason to believe that opium has any peripheral action.

**LINIMENTUM OPII AMMONIATUM.**

## AMMONIATED LINIMENT OF OPIUM.

Compound Camphor Liniment	...	...	...	...	30'00
Tincture of Opium	...	...	...	...	30'00
Liniment of Belladonna	...	...	...	...	5'00
Strong Solution of Ammonia	...	...	...	...	5'00
Liniment of Soap, sufficient to produce	...	...	...	...	100'00

Mix, and allow to stand for seven days; then filter quickly.

This is a stimulating liniment for use in rheumatism, lumbago, and sciatica.

**LINIMENTUM POTASSII IODIDI.**

## LINIMENT OF POTASSIUM IODIDE.

Soft Soap...	...	...	...	...	13'50
Potassium Iodide	...	...	...	...	10'00
Glycerin	...	...	...	...	7'00
Oil of Lemon	...	...	...	...	1'00
Alcohol (60 per cent.), sufficient to produce	...	...	...	...	100'00

Mix the glycerin with 60 of the alcohol, dissolve the soap in the mixture, add the oil of lemon and potassium iodide, shake till solution is effected, add sufficient of the alcohol to make up the required volume, and decant or filter, if necessary, after standing for a few hours.

This preparation should be used when a more fluid preparation is required than Linimentum Potassii Iodidi cum Sapone.



**LINIMENTUM POTASSII IODIDI CUM SAPONE.**

LINIMENT OF POTASSIUM IODIDE WITH SOAP.

Curd Soap, fresh, and in shavings	...	...	13.50
Potassium Iodide, powdered	...	...	10.125
Glycerin	...	...	6.75
Oil of Lemon	...	...	0.844
Distilled Water	...	...	67.5

Dissolve the soap in the distilled water and glycerin on a water-bath, mix the liquid with the potassium iodide by trituration, which should be continued until the mixture is cold, and add the oil of lemon after allowing the liniment to stand for an hour.

The product should be of a cream-like consistence; but varies in volume according to the amount of air incorporated in it during the trituration. As found in pharmacy, specimens of the liniment differ considerably in their physical properties; the variations being due to the quality of curd soap used, and to the differing amounts of water lost by evaporation during solution of the soap. The curd soap should be recently prepared, and the water lost by evaporation should be replaced.

This liniment is readily absorbed when applied with gentle friction. It is used for enlarged glands, especially of the neck, and as an absorbent to chronically inflamed joints. In cases where the use of a liquid alcoholic liniment is preferred, Linimentum Potassii Iodidi may be used.

NOTES.—A liquid preparation can be obtained by substituting soft soap for curd soap in the above formula (see Linimentum Potassii Iodidi). Professor Tichborne's process for preparing this liniment is as follows:—Dissolve 2 of potassium carbonate with heat in 10 of water, and add 6, by weight, of oleic acid; after effervescence has subsided, add  $7\frac{1}{2}$  of potassium iodide, 5 by weight of glycerin, and  $\frac{5}{8}$  of oil of lemon, mixed together, then add 40 of water, with sufficient solution of potash to make the liniment of the required consistence.

**LINIMENTUM SAPONIS.**

LINIMENT OF SOAP.

*Synonym.*—Opodeldoc.

Soft Soap	...	...	...	9.00
Camphor	...	...	...	4.50
Oil of Rosemary	...	...	...	1.69
Alcohol	...	...	...	72.00
Distilled Water	...	...	...	18.00

Dissolve the camphor and oil in the alcohol, add the soap and distilled water, shake till dissolved, and filter after allowing to stand for seven days.

Liniment of soap is a mild counter-irritant, used to rub sprains, contusions, and rheumatic joints, and to dilute more active liniments.

NOTES.—Linimentum Saponis, U.S.P., is prepared by mixing 6 of hard soap,  $4\frac{1}{2}$  of camphor, 1 of oil of rosemary, and  $72\frac{1}{2}$  of alcohol (95 per cent.) with sufficient water to produce 100 by volume. Linimentum Saponis Mollis, U.S.P., is prepared by dissolving 65 of linseed oil soft soap, and 2 of oil of lavender, in sufficient alcohol (95 per cent.) to produce 100 by volume.

**LINIMENTUM SINAPIS.**

## LINIMENT OF MUSTARD.

Volatile Oil of Mustard	...	...	...	4'00
Camphor...	...	...	...	6'00
Castor Oil	...	...	...	14'00
Alcohol	...	...	...	86'00

Add the oils to a solution of the camphor in the alcohol, and mix by shaking.

Liniment of mustard is a powerful counter-irritant and rubefacient, applied externally in pleurisy and pneumonia, or to relieve deep-seated pain.

NOTE.—Linimentum Sinapis Compositum, B.P., 1885, was prepared with  $2\frac{1}{2}$  of volatile oil of mustard, 2 of ethereal extract of mezereon, 6 of camphor, 14 of castor oil, and 88 of rectified spirit.

**LINIMENTUM SUCCINI COMPOSITUM.**

## COMPOUND LINIMENT OF AMBER.

Oil of Amber	...	...	...	25'00
Oil of Cloves	...	...	...	25'00
Olive Oil	...	...	...	50'00

Mix the oils by shaking them together.

This is a stimulating and rubefacient liniment, used to rub the chest in bronchitis, and the chest ailments of children; it is also useful for sprains, rheumatism, etc.

**LINIMENTUM TEREBINTHINÆ.**

## LINIMENT OF TURPENTINE.

Soft Soap	...	...	...	7'50
Camphor	...	...	...	5'00
Oil of Turpentine	...	...	...	65'00
Distilled Water, sufficient to produce	...	...	...	100'00

Add 10 of distilled water to the soft soap, mix, and add gradually, with constant trituration, a solution of the camphor in the oil of turpentine; when the mixture thickens to a creamy consistence add sufficient distilled water to make up the required volume.

Liniment of turpentine is used as a rubefacient and counter-irritant in rheumatism and chronic inflammation of joints.

NOTE.—Linimentum Terebinthinæ, U.S.P., is prepared by mixing 35, by weight, of oil of turpentine, with 65 of resin cerate, the latter (Ceratum Resinæ) being a mixture of 35 of resin with 15 of yellow beeswax and 50 of lard.

**LINIMENTUM TEREBINTHINÆ ACETICUM.**

## LINIMENT OF TURPENTINE AND ACETIC ACID.

Oil of Turpentine	...	...	...	44'00
Glacial Acetic Acid, by weight	...	...	...	11'00
Liniment of Camphor	...	...	...	44'00

Mix the oil and acetic acid with the liniment of camphor.

This liniment resembles Linimentum Terebinthinæ in its action, but it is more easily rubbed into the skin.

NOTE.—A preparation similar to this is known as St. John Long's Liniment.

### LINTEUM ACIDI BORICI.

BORIC ACID LINT.

*Synonyms.*—Boric Lint ; Boracic Acid Lint.

Boric lint is prepared by immersing absorbent lint in a saturated solution of boric acid in boiling distilled water ; then removing the lint from the liquid, allowing it to cool, pressing it to remove the excess of liquid, and leaving on racks to dry. It is usual to colour the lint pink with a little aniline dye, which is added to the hot solution of boric acid. The finished product usually contains from 40 to 50 per cent. of boric acid, according to requirements.

NOTE.—This and other medicated lints should be kept in sealed packages, under aseptic conditions, until required for use.

### LINTEUM ACIDI CARBOLICI.

CARBOLIC ACID LINT.

*Synonym.*—Carbolic Lint.

Carbolic acid lint is prepared by treating absorbent lint with a solution of carbolic acid, so that the finished product contains 5 or 10 per cent. of absolute phenol.

### LINTEUM ACIDI SALICYLICI.

SALICYLIC ACID LINT.

*Synonym.*—Salicylic Lint.

Salicylic acid lint is prepared by treating absorbent lint with a solution of salicylic acid, so that the finished product contains about 4 per cent. of the medicament (see Gossypium Acidi Salicylici).

### LINTEUM EUCALYPTI.

EUCALYPTUS LINT.

Eucalyptus lint is prepared by treating absorbent lint with a solution of oil of eucalyptus, so that the finished product contains 5 or 10 per cent. of the oil.

### LINTEUM IODOFORMI.

IODOFORM LINT.

Iodoform lint is prepared by treating absorbent lint with a solution of iodoform, so that the finished product contains about 10 per cent. of the medicament (see Gossypium Iodoformi).



**LINTEUM STYPTICUM.**

STYPTIC LINT.

*Synonym.*—Ferric Chloride Lint.

Styptic lint is prepared by treating absorbent lint with a solution of ferric chloride, so that the finished product may contain 15 per cent. of the medicament.

**LINUM.**

LINSEED.

*Synonym.*—Flaxseed.

Linseed consists of the dried ripe seeds of *Linum usitatissimum*, Linn. (N.O. Lineæ), a plant cultivated in most temperate and tropical regions. The fruit is a capsule containing ten seeds. These are collected when ripe, and the seeds separated and dried. Linseed is imported largely from the Argentine Republic, India, and the Baltic.

The seeds are small, brown, and glossy, and vary in length from 4 to 6 millimetres. They are ovoid in shape and flat, rounded at one end, but pointed at the other, where the hilum and micropyle are situated. The surface when seen under a lens appears to be minutely pitted. When cut transversely, and examined with a lens, the seeds show a white oily kernel, consisting of two comparatively large cotyledons, surrounded by a narrow endosperm. They have a slight odour, and a mucilaginous, oily taste.

The chief constituent of linseed is from 30 to 40 per cent. of fixed oil, but it also contains 15 per cent. of mucilage, which resides in the seed-coat, and about 25 per cent. of proteids, together with wax, resin, sugar, phosphates, and a small quantity of the glucoside linamarin. On incineration linseed should not yield more than 5 per cent. of ash.

Linseed is used in the preparation of Infusum Lini, which is a demulcent in coughs, especially those forms due to irritation of the pharynx and upper part of the respiratory passages. Infusion of linseed is also given as a demulcent drink in intestinal or urinary catarrhs.

NOTE.—A variety of linseed with pale yellowish seed-coats is known as white linseed.

**LINUM CONTUSUM.**

CRUSHED LINSEED.

Crushed linseed consists of the dried ripe seeds of *Linum usitatissimum*, Linn. (N.O. Lineæ), reduced to a coarse powder.

It should be recently prepared and have a bland odour, free from pungency or rancidity, when mixed with warm water. The powder should yield not less than 30 per cent. of oil when exhausted by carbon bisulphide. It should be free from starch, and, when incinerated with free access of air should not leave more than 5 per cent. of ash.

When kept for some time the oil in crushed linseed becomes

rancid, and affects the odour accordingly, while certain cruciferous seeds, which often occur as impurities, produce a pungent odour on the addition of water. Crushed linseed of good quality usually contains from 30 to 35 per cent. of oil. The powder should be stored in earthenware or metal vessels. Adulteration with ground linseed cake (left after extracting the oil from the seeds by pressure) and known as linseed meal, is detected by a low percentage of oil and a high percentage of ash. Sophistication with mineral or other oil can be detected by extracting the oil and comparing its properties with those of linseed oil. Crushed linseed often contains traces of starch from unripe seeds. On boiling 1 decigram of the powder with 20 mls of water, cooling, filtering, and making up to 100 with water, only a pale blue colour should be yielded on the addition of a small quantity of iodine.

Crushed linseed is used in the form of poultice (see Cataplasma Lini) to apply warmth and moisture locally for the relief of superficial or deep-seated inflammation.

### LIQUOR ACIDI ARSENIOSI.

#### SOLUTION OF ARSENIOUS ACID.

*Synonym.*—Solution of Arsenic.

Arsenious Acid, in powder	...	...	...	1'00
Distilled Water, sufficient to produce	...	...	...	100'00

Dissolve the arsenious acid by boiling. The solution should be free from the impurities mentioned under Acidum Arseniosum, and should respond to the tests given for that substance.

This solution is a colourless, odourless, and tasteless liquid, with a faintly acid reaction on litmus. It is of the same strength as the official solutions of arsenic, and possesses the advantage of being compatible with both acids and alkalies. The use of an alkali carbonate in preparing Liquor Arsenicalis, and the presence of acid in Liquor Arsenici Hydrochloricus, has no advantage, and is probably only a matter of tradition.

*Dose.*—1 to 5 decimils (2 to 8 minims).

*NOTE.*—Liquor Acidi Arsenosi, U.S.P., is prepared by dissolving 1 of arsenious acid and 5 by weight of diluted hydrochloric acid (10 per cent.), in sufficient distilled water to produce 100 by weight. Average dose, 2 decimils (3 minims).

### LIQUOR ACIDI CHROMICI.

#### SOLUTION OF CHROMIC ACID.

Chromic Acid	...	...	...	...	25'00
Distilled Water...	...	...	...	...	75'00

Dissolve the chromic acid in the distilled water. The product should contain the equivalent of 25 per cent. of chromic anhydride,  $\text{CrO}_3$ . It is an orange-red liquid without odour. Caustic and strongly acid in reaction. Specific gravity, 1.208. It should respond to the tests for Acidum Chromicum.

This solution is used as a caustic to warts, granulations, and indolent ulcerations, and should be applied by means of a pointed glass rod. It is diluted with 10 to 100 parts of water for use as a paint, gargle, or lotion. It is decomposed by such organic substances as glycerin, alcohol, sugar, and tannin.

NOTE.—The specific gravity of this solution is officially given as 1·185, but that figure has been shown to be inaccurate.

### LIQUOR ADRENINÆ AROMATICUS.

AROMATIC SOLUTION OF ADRENINE.

*Synonym.*—Adrenaline Inhalant.

Adrenaline ... ..	0·10
Absolute Alcohol ... ..	12·50
Boric Acid, free from iron ... ..	0·50
Hydrochloric Acid, a sufficient quantity.	
Eucalyptol ... ..	5·00
Oil of Gaultheria... ..	2·00
Castor Oil, sufficient to produce ... ..	100·00

Dissolve the boric acid in the alcohol, mix the adrenaline with about 2·5 of the solution, and add just sufficient hydrochloric acid to dissolve the adrenaline, applying it by means of a glass rod which is dipped alternately into the acid and alcohol, and shaking the mixture after each addition of acid. When solution of the adrenaline is complete, add the remainder of the absolute alcohol, then add the eucalyptol and oil of gaultheria, make up the required volume by the addition of castor oil, and filter if necessary.

This preparation is suitable for use with an atomiser, as a soothing and astringent application in inflammatory affections, such as hay fever and Eustachian and post-nasal catarrh.

NOTES.—It is important that the alcohol used in preparing this solution should be absolute, that strong hydrochloric acid should be used, and no more of the acid added than is strictly necessary. Solution of the adrenaline should be effected in a perfectly dry vessel, with as little exposure to air as possible.

### LIQUOR ADRENINÆ BORICUS.

BORIC SOLUTION OF ADRENINE.

*Synonym.*—Solution of Adrenaline Borate.

Adrenaline ... ..	0·10
Boric Acid ... ..	0·20
Chloroform ... ..	0·50
Distilled Water, sufficient to produce ... ..	100·00

Dissolve the boric acid in 10 of recently boiled distilled water, cool, add the chloroform, dissolve the adrenaline in the solution, and make up the required volume by the addition of recently boiled and cooled distilled water.

The properties of this solution are similar to those of *Liquor Adreninæ Hydrochloricus*.

NOTE.—This solution should be kept in small amber-coloured bottles which have been rinsed with diluted hydrochloric acid and thoroughly dried.



**LIQUOR ADRENINÆ HYDROCHLORICUS.****HYDROCHLORIC SOLUTION OF ADRENINE.**

*Synonyms.*—Solution of Adrenine; Solution of Adrenine Hydrochloride.

Adrenine	...	...	...	...	0·10
Chloroform	...	...	...	...	0·50
Sodium Chloride	...	...	...	...	0·90
Diluted Hydrochloric Acid	...	...	...	...	0·25
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the sodium chloride in 90 of recently boiled distilled water, cool, add the chloroform and hydrochloric acid, dissolve the adrenine in the acid solution, and make up the required volume by the addition of recently boiled and cooled distilled water.

This solution is used internally as a cardiac stimulant, especially in sudden failure, and to arrest hæmorrhage. It is especially employed in renal, vesical, and intestinal bleeding; it is valuable in hæmatemesis, but is contra-indicated in hæmoptysis. Externally, it is employed as a vaso-constrictor and hæmostatic. Injected hypodermically, 1 of active principle in 10000 or 15000, with cocaine or eucaine, it localises anæsthesia and prevents absorption. It controls hæmorrhage in ophthalmic and nasal surgery (1 of active principle in 5000). For use as a nasal spray solution in hay fever and asthma, 1 in 5000 to 10000 is suitable (see also Nebula Adreninæ). A 1 in 5000 solution is applied on a tampon to arrest uterine hæmorrhage, or on a piece of cotton wool in epistaxis. Dilutions of adrenine are best prepared with normal saline solution.

*Dose.*—3 to 20 decimils (5 to 30 minims).

*NOTES.*—This solution should be kept in small amber-coloured bottles which have been rinsed with diluted hydrochloric acid and thoroughly dried. If prepared with natural adrenine, it tends to become coloured on exposure to air and light, with a corresponding loss of strength.

**LIQUOR ALUMINII ACETATIS.****SOLUTION OF ALUMINIUM ACETATE.**

*Synonyms.*—Liquor Aluminii Acetici; Burow's Solution.

Aluminium Sulphate	...	...	...	...	22·50
Acetic Acid	...	...	...	...	27·00
Precipitated Calcium Carbonate	...	...	...	...	9·75
Distilled Water...	...	...	...	...	75·00

Dissolve the aluminium sulphate in 60 of the water, add the acetic acid, and then the calcium carbonate mixed with the remainder of the water. Allow to stand for twenty-four hours in a cool place, stirring occasionally; then filter the solution. It should be a clear, colourless liquid, with a faint smell of acetic acid, and a sweetish, astringent taste. Specific gravity, 1·044 to 1·048. Precipitated with ammonia, and the precipitate ignited, 2·3 to 2·6 per cent. of aluminium oxide should result, corresponding to 7·5 to 8 per cent. of basic aluminium acetate.

Diluted with 2 parts of water, this solution makes an excellent antiseptic lotion for dressing lacerated wounds. Gauze impregnated

with the solution diluted with an equal volume of water is used as an antiseptic dressing. It is used as a mouth wash and gargle, diluted with three times its volume of rose or orange-flower water.

*Dose*.—4 to 8 decimils (6 to 12 minims).

NOTE.—This preparation corresponds to *Liquor Aluminii Acetici* of the German and Austrian Pharmacopœias.

## LIQUOR AMMONIÆ.

### SOLUTION OF AMMONIA.

*Synonyms*.—Aqua Ammoniæ; Ammonia Water.

Strong Solution of Ammonia ...	...	...	33.33
Distilled Water ...	...	...	66.66

Add the water to the strong solution of ammonia, and mix.

The product is a colourless liquid having a pungent, suffocating odour and alkaline reaction. Specific gravity, 0.959 (about 0.958 at 25°). It should contain 10 per cent. by weight of ammonia,  $\text{NH}_3$ , and respond to the same tests as *Liquor Ammoniæ Fortis*.

Solution of ammonia, well diluted, may be sniffed up the nose, and excites the fifth nerve-endings, causing acceleration of the heart, stimulation of respiration and some vaso-constriction. The rationale of smelling salts depends upon these reflex effects. Internally it reflexly excites the medulla, also, from the stomach, is rapidly neutralised and absorbed mainly as ammonium chloride. Its effects after absorption are therefore those of ammonium chloride—a mild expectorant, diaphoretic and diuretic. The  $\text{NH}_4$  ion has no specific action after absorption on the heart, nor is the central nervous system stimulated, as sufficient ammonium never reaches the circulation, being as rapidly excreted as it is absorbed. Externally it is rubefacient and is used to neutralise insect stings.

*Dose*.—6 to 12 decimils (10 to 20 minims).

NOTES.—This preparation is used as a reagent, as are also strong solution of ammonia and solutions of various ammonium salts, most of which are described elsewhere. Solution of ammonium molybdate is prepared by dissolving 10 of the salt in sufficient distilled water to produce 100, and filtering. Solutions of ammonium oxalate and thiocyanate are similarly prepared by dissolving 2.5 of the respective salts in sufficient distilled water to produce 100, and filtering.

## LIQUOR AMMONIÆ ANISATUS.

### ANISATED SOLUTION OF AMMONIA.

*Synonyms*.—Liquor Ammonii Anisatus; Spiritus Ammoniæ Anisatus.

Anethol ...	...	...	...	...	3.50
Solution of Ammonia ...	...	...	...	...	16.50
Alcohol, sufficient to produce ...	...	...	...	...	100.00

Dissolve the anethol in 80 of the alcohol, add the solution of ammonia, and make up the required volume with alcohol.

The product is a clear and colourless or pale yellow liquid, having an aromatic, pungent odour.

It has properties resembling those of aromatic spirit of ammonia.

*Dose*.—1 to 4 mls (20 to 60 minims).

NOTE.—This preparation corresponds to *Liquor Ammonii Anisatus* of the German Pharmacopœia.

**LIQUOR AMMONIÆ DETERGENS.**

DETERGENT SOLUTION OF AMMONIA.

*Synonym.*—Household Ammonia.

Strong Solution of Ammonia	...	...	...	30·00
Oleic Acid	...	...	...	6·00
Alcohol	...	...	...	6·00
Distilled Water, sufficient to produce	...	...	...	100·00

Mix the distilled water with the strong solution of ammonia, oleic acid and alcohol, and shake well. About 5 per cent. of borax may be added if desired, together with a little oil of lavender or other suitable perfume.

This solution is employed largely, after dilution, for use as a cleansing agent for the skin, and for domestic purposes generally. It may be added to baths in the proportion of 150 to 300 mls to 140 litres (5 to 10 fluid ounces to 30 gallons) of water.

NOTE.—If a "cloudy" preparation be desired, about half of the distilled water in the above formula should be replaced by hard tap-water, the exact proportion depending upon the amount of total solids in the hard water.

**LIQUOR AMMONIÆ FORTIS.**

STRONG SOLUTION OF AMMONIA.

*Synonyms.*—Aqua Ammonia Fortior; Stronger Ammonia Water.

Strong solution of ammonia may be prepared by heating a mixture of ammonium chloride and slaked lime, and passing the resulting gas into water.

It is a colourless liquid with a very pungent, suffocating odour, and strong alkaline reaction. It should contain 32·5 per cent. by weight of ammonia. Specific gravity, about 0·888 (about 0·883 at 25°). It should be free from arsenium, lead, iron, aluminium, zinc, calcium, magnesium, potassium, sodium, carbonates, sulphates, sulphides, and tarry matter; and almost free from chlorides. This solution is diluted to form Liquor Ammonia and other preparations for therapeutic use.

NOTES.—The specific gravity of this solution is officially given as 0·891, but a solution of that gravity will contain only about 31·5 per cent. by weight of ammonia. Aqua Ammonia Fortior, U.S.P., contains 28 per cent. by weight of gaseous ammonia, and its specific gravity is 0·901 (about 0·897 at 25°).

**LIQUOR AMMONII ACETATIS.**

SOLUTION OF AMMONIUM ACETATE.

Ammonium Carbonate	...	...	...	5·00
Acetic Acid, a sufficient quantity.				
Distilled Water, sufficient to produce	...	...	...	100·00

Add the ammonium carbonate gradually to 50 of the water, dissolve, add sufficient acetic acid to form a neutral solution, and make up the required volume with distilled water.



The product is a clear, colourless, liquid, having a somewhat acetous odour and a sharp saline taste. It is employed as a mild diaphoretic, expectorant and diuretic, especially in the feverish ailments of children. The ammonia is excreted as carbonate, and renders the urine more alkaline.

*Dose.*—8 to 23 mls (2 to 6 fluid drachms).

*NOTES.*—Solution of ammonium acetate should be kept in green glass bottles. As the end reaction in making the above solution is somewhat difficult to define, it has been suggested that the strengths of the ammonium carbonate and acid should be previously determined volumetrically, and the correct quantities for neutralisation then used. Another useful method is to place a crystal of citric acid and a crystal of potassium bicarbonate in separate tubes, and add a little of the solution to each. Small bubbles of gas are given off by one of the crystals if, and according as, the solution is too alkaline or too acid. *Liquor Ammonii Acetatis*, U.S.P., is prepared by dissolving 5 of ammonium carbonate in 100 of diluted acetic acid (6 per cent.), and contains about 7 per cent. of ammonium acetate.

### LIQUOR AMMONII ACETATIS FORTIOR.

STRONGER SOLUTION OF AMMONIUM ACETATE.

Ammonium Carbonate... .. 25'00

Acetic Acid, a sufficient quantity.

Distilled Water, sufficient to produce... 100'00

Add the ammonium carbonate gradually to about 75 of acetic acid, then add more of the acid until a neutral liquid results, and make up the required volume with distilled water.

The product is a colourless liquid, with a strong, sharp saline taste, and an acetous odour. It is five times the strength of *Liquor Ammonii Acetatis*, and has similar properties to, and is used chiefly in the preparation of, the weak solution (see Notes under *Liquor Ammonii Acetatis*).

*Dose.*—1½ to 5 mls (25 to 75 minims).

*NOTES.*—This preparation was official in the British Pharmacopœia, 1885. It should be kept in green glass bottles. An alternative method of preparing the solution is to nearly neutralise the acetic acid with solution of ammonia, and complete the neutralisation with ammonium carbonate, so as to impregnate the liquid with carbon dioxide.

### LIQUOR AMMONII CITRATIS.

SOLUTION OF AMMONIUM CITRATE.

Citric Acid... .. 12'50

Ammonium Carbonate... .. about 8'75

Distilled Water, sufficient to produce... 100'00

Add the citric acid to 62·5 of the water, dissolve, add sufficient ammonium carbonate to neutralise, and make up the required volume with distilled water.

The product is a colourless, odourless liquid, with a saline taste.

Solution of ammonium citrate has properties similar to those of *Liquor Ammonii Acetatis*, and is used for the same purposes.

*Dose.*—8 to 23 mls (2 to 6 fluid drachms).

*NOTE.*—Solution of ammonium citrate should be kept in green glass bottles.

**LIQUOR AMMONII CITRATIS FORTIOR.**

STRONGER SOLUTION OF AMMONIUM CITRATE.

Citric Acid	...	...	...	...	50·00
Strong Solution of Ammonia, a sufficient quantity.					
Distilled Water, sufficient to produce	...				100·00

Neutralise the acid with the strong solution of ammonia, of which about 36 will be required; then add sufficient distilled water to make up the required volume.

The product is a colourless, odourless liquid, with a strong saline taste. It is four times the strength of *Liquor Ammonii Citratis*.

*Dose*.—2 to 6 mils ( $\frac{1}{2}$  to  $1\frac{1}{2}$  fluid drachms).

*NOTES*.—This preparation was official in the British Pharmacopœia, 1885. It should be kept in green glass bottles.

**LIQUOR ANDROGRAPHIDIS CONCENTRATUS.**

CONCENTRATED SOLUTION OF ANDROGRAPHIS.

Andrographis, in No. 40 powder	...	...	50·00
Alcohol (20 per cent.), sufficient to produce	...		100·00

Moisten the drug with 25 of the alcohol, pack in a percolator, and set aside for three days; then percolate with 100 of the alcohol, added in ten equal portions at intervals of twelve hours, and finally percolate with sufficient of the alcohol to make up the required volume.

This preparation is official in India and the Eastern Colonies, where it is used as a stomachic and bitter.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR ANTIMONII CHLORIDI.**

SOLUTION OF ANTIMONIOUS CHLORIDE.

Solution of antimonious chloride is prepared by dissolving 40 of antimonious sulphide in 200 of hydrochloric acid by the aid of heat, which must be augmented as the evolution of gas diminishes, until the liquid boils. Maintain the liquid at boiling-point for fifteen minutes, then filter through calico until a clear solution is obtained, and concentrate by evaporation to 100 by volume. The product is a heavy, caustic liquid. Specific gravity, 1·47.

This solution can be obtained colourless, but is usually of a yellowish-red colour through the intentional addition of ferric chloride. It was formerly employed as a powerful caustic and escharotic to cancers and ulcerated wounds.

*NOTES*.—Solution of antimonious chloride was official in the British Pharmacopœia, 1885. It should be kept in well-stoppered bottles.

**LIQUOR ARISTOLOCHIÆ CONCENTRATUS.**

CONCENTRATED SOLUTION OF ARISTOLOCHIA.

Aristolochia, in No. 40 powder	...	...	50·00
Alcohol (20 per cent.), sufficient to produce	...		100·00

This solution is prepared in the same way as *Liquor Andrographidis Concentratus*.

Concentrated solution of *aristolochia* is official in India and the Eastern Colonies, where it is used as an aromatic bitter.

*Dose*.—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

## LIQUOR ARSENICALIS.

### ARSENICAL SOLUTION.

*Synonyms*.—*Liquor Potassii Arsenitis*; *Fowler's Solution*.

Arsenious Acid, in powder	...	...	...	1'00
Potassium Carbonate	...	...	...	1'00
Compound Tincture of Lavender	...	...	...	3'125
Distilled Water, sufficient to produce	...	...	...	100'00

Place the arsenious acid, potassium carbonate, and 50 of water in a flask graduated to hold 100, and dissolve by the aid of heat; when cool add the tincture and sufficient distilled water to make up the required volume.

The product is a reddish alkaline liquid, with the odour of lavender, and a disagreeable metallic after-taste. It is incompatible with *Liquor Hydrargyri Perchloridi* and with *Liquor Strychninæ*. If mixed with the latter crystals of strychnine may be deposited. A better preparation is *Liquor Acidi Arseniosi*.

*Dose*.—1 to 5 decimils (2 to 8 minims), which may be exceeded.

NOTES.—The arsenious acid dissolves more readily if heated with less water. The "*Fowler's Solution*" of foreign pharmacopœias is colourless.

## LIQUOR ARSENICI HYDROCHLORICUS.

### HYDROCHLORIC SOLUTION OF ARSENIC.

*Synonym*.—*Acid Solution of Arsenic*.

Arsenious Acid, in powder	...	...	...	1'00
Hydrochloric Acid	...	...	...	1'25
Distilled Water, sufficient to produce	...	...	...	100'00

Place the arsenious and hydrochloric acids, and 50 of water in a flask graduated to hold 100, and dissolve by the aid of heat; when cool add sufficient distilled water to make up the required volume.

The product is a clear, colourless liquid with an acid reaction. It is suitable for use in acid mixtures, and with *Liquor Strychninæ*, but possesses no advantages over *Liquor Acidi Arseniosi*.

*Dose*.—1 to 5 decimils (2 to 8 minims).

NOTES.—The arsenious acid dissolves more readily if heated with less water. *De Valangin's Solutio Mineralis* (*Valangin's Solution*) was about one-third the strength of this preparation, containing  $1\frac{1}{2}$  grains of arsenious acid and 30 minims of hydrochloric acid in 1 fluid ounce.



**LIQUOR ARSENII ET HYDRARGYRI IODIDI.**

SOLUTION OF ARSENIOS AND MERCURIC IODIDES.

*Synonym.*—Donovan's Solution.

Arsenious Iodide	...	...	...	...	1'00
Mercuric Iodide...	...	...	...	...	1'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the iodides in 15 to 20 of the distilled water by trituration, then filter, and pass sufficient distilled water through the filter to make up the required volume.

The product is a pale yellow, or almost colourless, transparent liquid having a metallic taste. It is given in cutaneous disorders and syphilis. It is incompatible with acids, aromatic spirit of ammonia, and all alkaloidal solutions and tinctures.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTE.*—In making the above solution the crystalline variety of arsenious iodide should be used, or the preparation will be deficient in strength.

**LIQUOR ATROPINÆ SULPHATIS.**

SOLUTION OF ATROPINE SULPHATE.

Atropine Sulphate	...	...	...	...	1'00
Salicylic Acid	...	...	...	...	0'12
Distilled Water, sufficient to produce	...	...	...	...	100'00

Add the atropine sulphate and salicylic acid to the water, immediately after the latter has been boiled and cooled, and dissolve.

The product is a clear, colourless liquid, and is intended principally for ophthalmic use, but for most purposes a solution half this strength is preferred. The solution has all the actions of atropine, and may be used to stop sweating, to diminish bronchial secretion, in ptalism, to cut off excessive vagal inhibition, to relieve chronic constipation, and muscular spasm in asthma, lead colic, and whooping-cough, to dilate the pupil, and to stimulate the motor area and respiratory centre in the brain.

*Dose.*—3 to 6 centimils ( $\frac{1}{2}$  to 1 minim).

*NOTE.*—The salicylic acid in this preparation sometimes irritates the eye.

**LIQUOR AURI ET ARSENII BROMATUS.**

BROMATED SOLUTION OF GOLD AND ARSENIUM.

*Synonyms.*—Liquor Auri et Arsenii Bromidi; Liquor Auri Bromidi Arsenatus.

Arsenious Acid	...	...	...	...	0'45
Potassium Carbonate	...	...	...	...	0'45
Bromine	...	...	...	...	1'15
Gold, in leaf, pure	...	...	...	...	0'15
Distilled Water, sufficient to produce	...	...	...	...	100'00

Add the arsenious acid and potassium carbonate to 20 of the distilled water in a flask, and boil until solution is complete; then place the gold leaf in a wide-mouthed bottle, add 60 of distilled water, run in the bromine, shake until it is dissolved, add the

solution of arsenious acid, and shake for a few seconds. Transfer the mixture to a flask or retort, boil until bromine vapours are no longer given off, allow to cool, add sufficient distilled water to produce 100 by volume, and filter.

The product occurs as a reddish liquid. It is employed in rheumatism, epilepsy, syphilis, and cutaneous disorders. It was at one time thought to have a specific action on connective tissue of pathological origin, but its value in that respect is very doubtful.

*Dose.*—3 to 6 decimils (5 to 10 minims).

*NOTE.*—This preparation contains the equivalent of about  $\frac{1}{24}$  grain of arsenious acid, and  $\frac{3}{32}$  grain of gold tribromide in 10 minims.

### LIQUOR BERBERIDIS CONCENTRATUS.

#### CONCENTRATED SOLUTION OF BERBERIS.

Berberis, in No. 40 powder	...	...	...	50.00
Alcohol (20 per cent.), sufficient to produce	...	...	...	100.00

This solution is prepared in the same way as Liquor Andrographidis Concentratus, substituting berberis for andrographis.

Concentrated solution of berberis is official in India and the Eastern Colonies, where it is used as a bitter.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### LIQUOR BISMUTHI CONCENTRATUS.

#### CONCENTRATED SOLUTION OF BISMUTH.

Bismuth Oxynitrate	...	...	...	...	14.00
Nitric Acid	...	...	...	...	10.00
Citric Acid	...	...	...	...	10.00
Sodium Bicarbonate	...	...	...	...	17.50
Solution of Ammonia, a sufficient quantity.					
Solution of Ammonium Citrate	...	...	...	...	24.00
Distilled Water, sufficient to produce	...	...	...	...	100.00

Dilute the nitric acid with an equal volume of distilled water, dissolve the bismuth oxynitrate in the mixture by the aid of gentle heat, and add the citric acid, previously dissolved in 14 of distilled water; then add gradually and with constant stirring the sodium bicarbonate, previously mixed with 14 of distilled water, collect and wash the precipitate until free from nitrates, drain well, and dissolve in 12 of solution of ammonia, or more if necessary. Finally, add the solution of ammonium citrate, and make up the required volume with distilled water.

The product is a colourless liquid, with a metallic taste, and an alkaline reaction. It contains the equivalent of 10 per cent. of bismuth oxide, and tends to deposit if exposed to the air. The solution is twice the strength of Liquor Bismuthi et Ammonii Citratis, and is used for the same purposes.

*Dose.*—1 to 2 mls (15 to 30 minims).

**LIQUOR BISMUTHI ET AMMONII CITRATIS.**

SOLUTION OF BISMUTH AND AMMONIUM CITRATE.

*Synonym.*—Liquor Bismuthi.

Bismuth Oxynitrate	...	...	...	...	7·00
Potassium Citrate	...	...	...	...	7·00
Potassium Carbonate	...	...	...	...	2·00
Nitric Acid	...	...	...	...	5·00
Solution of Ammonia, a sufficient quantity.					
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the potassium citrate in one and a half times its weight of distilled water, and dissolve the potassium carbonate separately in its own weight of distilled water; also dissolve the bismuth oxynitrate in the nitric acid, previously mixed with an equal volume of distilled water. Pour the bismuth solution slowly into the potassium citrate solution, with constant stirring, then add the potassium carbonate solution, again stir, and add 20 of distilled water. Finally, heat the mixture to boiling-point, pour it on a filter, wash the precipitate with hot water until it is free from nitrates, add just sufficient solution of ammonia to dissolve it, and make up the required volume with distilled water.

The product is a colourless liquid with a slightly metallic taste, having only a slight alkaline reaction. It contains the equivalent of 5 per cent. of bismuth oxide, and should be free from silver, lead, copper, arsenium, iron, selenium, or tellurium. As the solution contains no excess of ammonium citrate, it is readily precipitated by alkali bicarbonates. The bismuth compound in this preparation is converted in the stomach into the oxychloride, and so acts like the other salts of bismuth. The solution is incompatible with acids.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES.*—It has been pointed out that if the quantity of potassium carbonate in the above formula be increased by one-third, the washings from the precipitate will be almost neutral, and loss of bismuth will be reduced to a minimum. Commercial samples of solution of bismuth and ammonium citrate are sometimes found to contain an excess of the ammonium salt, and are therefore not so readily precipitated by alkali bicarbonates. The addition of a small proportion of alcohol to the solution has been suggested, to prevent the development of fungoid growths. A more satisfactory product can be made from an equivalent quantity of crystalline bismuth nitrate, with a correspondingly larger quantity of potassium carbonate.

**LIQUOR BORACIS COMPOSITUS.**

COMPOUND SOLUTION OF BORAX.

*Synonyms.*—Collunarium Acidi Carbolici Compositum;  
Dobell's Solution or Collunarium.

Borax	...	...	...	...	1·50
Sodium Bicarbonate	...	...	...	...	1·50
Carbolic Acid	...	...	...	...	0·30
Glycerin	...	...	...	...	3·50
Distilled Water, sufficient to produce	...	...	...	...	100·00



Dissolve the salts in about 50 of the water; then add the glycerin, carbolic acid, and sufficient distilled water to produce the required volume. The product is colourless, with a faint odour of carbolic acid.

This solution is used as an antiseptic wash for nasal irrigation, and is sometimes applied by means of a spray.

### LIQUOR BROMI FORTIS.

STRONG SOLUTION OF BROMINE.

Bromine, by volume	...	...	...	33'00
Potassium Bromide	...	...	...	54'00
Distilled Water, sufficient to produce	...	...	...	100'00

Mix the bromine and potassium bromide in a glass-stoppered bottle graduated to hold 100; gradually, and with constant shaking, add sufficient distilled water to produce the required volume.

The product is a dark brownish-red liquid with a disagreeable, irritating and suffocating odour.

NOTE.—An equivalent quantity of this solution may be used in place of bromine in making sodium hypobromite solution for urea determinations.

### LIQUOR BROMOCHLORAL COMPOSITUS.

COMPOUND SOLUTION OF BROMO-CHLORAL.

Chloral Hydrate	...	...	...	18'00
Potassium Bromide	...	...	...	18'00
Juice of Hyoscyamus	...	...	...	16'50
Liquid Extract of Liquorice	...	...	...	2'50
Tincture of Orange	...	...	...	4'00
Tincture of Indian Hemp	...	...	...	4'00
Syrup	...	...	...	20'00
Distilled Water, sufficient to produce	...	...	...	100'00

Mix the juice of hyoscyamus, liquid extract of liquorice, tinctures, and syrup, dissolve the chloral hydrate in the mixture, and add the potassium bromide dissolved in 35 of distilled water; then filter, and pass sufficient distilled water through the filter to make up the required volume.

The product is a dark brown liquid, with an aromatic odour and a sweetish taste. It contains nearly 10 grains each of chloral hydrate and potassium bromide in 1 fluid drachm, and is used as a hypnotic and sedative.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

### LIQUOR CALCII CHLORIDI.

SOLUTION OF CALCIUM CHLORIDE.

Calcium Chloride	...	...	...	16'00
Distilled Water, sufficient to produce	...	...	...	100'00

Dissolve the calcium chloride in the water, and filter if necessary.

The product is a clear, colourless, odourless, liquid, with a sharp saline taste. It is used in dispensing, to avoid the disadvantage of weighing a deliquescent and variable salt.

*Dose*.—1 to 3 mls (15 to 45 minims).

*NOTE*.—Liquor Calcii Chloridi was official in the British Pharmacopœia, 1885.

## LIQUOR CALCIS.

### SOLUTION OF LIME.

*Synonyms*.—Solution of Calcium Hydroxide; Lime Water.

Calcium Hydroxide, washed ...	...	...	1·25
Distilled Water...	...	...	100·00

Place the washed calcium hydroxide, which should preferably be prepared from marble, in a green glass stoppered bottle; add the water, shake for a few minutes, and set aside for twelve hours, after which the clear solution may be drawn as required for use. It should be a colourless, odourless, liquid, with a mild caustic taste, and an alkaline reaction. It readily absorbs carbon dioxide from the air, a pellicle forming on the surface, or the liquid becoming turbid from separation of calcium carbonate. On heating it becomes turbid, owing to the separation of calcium hydroxide, which redissolves when the liquid is cooled. It contains rather more than 0·1 per cent. w/v of lime, CaO, and should be free from lead and chlorides.

Lime water is used as a mild astringent to the skin in inflammatory conditions, and when mixed with linseed or olive oil forms a popular remedy for burns. It is frequently added to milk to prevent the formation of large clots of curd in the stomach. Taken by the mouth it acts as a mild astringent and alkali in the stomach, and is used largely in the treatment of vomiting and diarrhoea of infants. Lime water increases the coagulability of the blood and has the other specific effects of the Ca ion.

*Dose*.—30 to 120 mls (1 to 4 fluid ounces).

*NOTES*.—This preparation should be kept in full, green glass bottles, protected from the air. Liquor Calcis, U.S.P., should contain not less than 0·14 per cent. of pure calcium hydroxide.

## LIQUOR CALCIS CHLORINATÆ.

### SOLUTION OF CHLORINATED LIME.

*Synonym*.—Bleaching Liquid.

Chlorinated Lime ...	...	...	10·00
Distilled Water...	...	...	100·00

Add the chlorinated lime to the water, mix, set aside in a stoppered bottle for three hours, shaking occasionally, and filter through calico.

The product is a clear liquid with an odour of chlorine. Specific gravity about 1·055. When fresh the solution should yield about 3 per cent. of available chlorine.

Solution of chlorinated lime is a germicide. Applied to the skin it is slightly irritant; diluted with 12 to 20 parts of water, it is used as a wash for foul ulcers, as a nasal or vaginal injection, or as a gargle in tonsilitis and diphtheria, but its usefulness is limited on account of its irritant action. The solution should be freshly prepared when required, as it deteriorates on keeping.

NOTE.—Solution of chlorinated lime should be kept in well-stoppered bottles, in a cool, dark place.

## LIQUOR CALCIS SACCHARATUS.

### SACCHARATED SOLUTION OF LIME.

Calcium Hydroxide	...	...	...	...	5'00
Refined Sugar	...	...	...	...	10'00
Distilled Water...	...	...	...	...	100'00

Dissolve the sugar in the water, add the calcium hydroxide, which should preferably be prepared from marble, transfer to a green glass stoppered bottle, and set aside for a few hours, shaking occasionally; finally, draw off the clear liquid, avoiding unnecessary exposure to air. It is colourless and odourless, with a sweet, alkaline taste. Specific gravity, 1.055.

Saccharated solution of lime is employed, similarly to lime water, as an antacid for the use of infants and children. Larger quantities of lime can be given than by administering lime water.

*Dose.*—1 to 4 mils (15 to 60 minims).

NOTES.—This preparation contains about 2 per cent. by weight of lime, CaO. The presence of iron as an impurity in the calcium hydroxide causes the solution to become coloured on keeping; when the ingredients are pure it remains colourless and clear when protected from the air. Syrupus Calcis, U.S.P., is a similar preparation, made with  $6\frac{1}{2}$  of calcium hydroxide, 35 of sugar, and sufficient water to produce 100.

## LIQUOR CALCIS SULPHURATÆ.

### SOLUTION OF SULPHURATED LIME.

*Synonyms.*—Lotio Calcis Sulphuratæ; Solutio Sulfureti Calcici; Vleminckx's Solution.

Quicklime	...	...	...	...	2'00
Sublimed Sulphur	...	...	...	...	5'00
Water, sufficient to produce	...	...	...	...	100'00

Slake the lime with a small quantity of water, add the sulphur and more water, then boil the liquid until the sulphur is dissolved, and replace the water lost by evaporation; pour the liquid into a closed vessel, allow it to subside, and decant the clear solution. It is a yellowish-red liquid, which is decomposed by acids, with evolution of hydrogen sulphide and separation of sulphur.

Diluted with one or more parts of water, this solution is used as a paint for scabies. For a bath, in chronic psoriasis and other skin diseases, a dessertspoonful is added for each gallon of water.

NOTE.—This solution should be prepared in a well-enamelled or porcelain dish.



**LIQUOR CALUMBÆ CONCENTRATUS.**

## CONCENTRATED SOLUTION OF CALUMBA.

Calumba Root, in No. 5 powder	...	...	50·00
Alcohol	...	...	22·50
Distilled Water, sufficient to produce	...	100·00	

Add the drug to 50 of the water, allow to macerate for twenty-four hours, press strongly, again macerate with 50 of the water for twenty-four hours, and again press; then mix the expressed liquids, heat for five minutes at a temperature of 82°, cool, add the alcohol, allow to settle, decant or filter; and add sufficient distilled water to make up the required volume.

Concentrated solution of calumba acts as a simple bitter. Infusum Calumbæ Concentratum is a more satisfactory preparation.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR CAOUTCHOUC.**

## SOLUTION OF INDIARUBBER.

Indiarubber, in fine shreds	...	...	5·00
Benzol	...	...	50·00
Carbon Bisulphide	...	...	50·00

Add the indiarubber to the carbon bisulphide, and set aside in a cool place until a jelly is formed; then add the benzol and shake occasionally until a clear solution is obtained.

Solution of indiarubber is a reddish-yellow, somewhat viscid liquid. It is used as an adhesive agent in the preparation of mustard leaves, and as a substitute, in certain cases, for collodion. It dries on the skin to a sticky film. For the preparation of solutions of chrysarobin, etc., for dermatological use, Liquor Gutta Percha is to be preferred.

**LIQUOR CARMINI.**

## SOLUTION OF CARMINE.

Carmine	...	...	6·00
Solution of Ammonia	...	...	35·00
Glycerin	...	...	35·00
Distilled Water, sufficient to produce	...	100·00	

Triturate the carmine with the solution of ammonia, add the glycerin, and heat on a water-bath, with constant stirring, until the ammonia is dissipated; then cool, and add sufficient distilled water to make up the required volume. The product is a somewhat thick, dark, crimson liquid.

Solution of carmine is a suitable colouring agent for alkaline mixtures, mouth washes, lotions, etc., in the proportion of about 1 per cent.; the red colouring matter is precipitated by acids, so that a yellow colouration is produced when the solution is added to acid liquids.

**LIQUOR CAULOPHYLLI ET PULSATILLÆ.**

SOLUTION OF CAULOPHYLLUM AND PULSATILLA.

Caulophyllum Root, in coarse powder	...	50'00
Pulsatilla, in coarse powder	... ..	50'00
Diluted Sulphuric Acid	... ..	0'30
Alcohol, a sufficient quantity.		
Distilled Water, sufficient to produce	...	100'00

Macerate the powders in 300 of the alcohol for forty-eight hours, then percolate, reserving the first 60 of percolate, and continuing the percolation with 300 of water; concentrate the weak percolates to 40, mix with the reserved portion, add the diluted sulphuric acid, set aside for twenty-four hours, and filter.

This solution is used as a sedative in dysmenorrhœa and uterine disorders, but it is of doubtful value.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR CHIRATÆ CONCENTRATUS.**

CONCENTRATED SOLUTION OF CHIRETTA.

Chiretta, in No. 40 powder	... ..	50'00
Alcohol (20 per cent.), sufficient to produce	...	100'00

This solution is prepared in the same way as Liquor Andrographidis Concentratus.

Concentrated solution of chiretta acts as a simple bitter. Infusum Chiratæ Concentratum is a better preparation.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR CHLORI.**

SOLUTION OF CHLORINE.

*Synonym.*—Aqua Chlorig.

Solution of chlorine may be prepared by gently heating  $3\frac{1}{4}$  of finely powdered black oxide of manganese with 20 of hydrochloric acid, diluted with  $6\frac{1}{2}$  of distilled water, and passing the resulting gas through a wash-bottle containing  $6\frac{1}{2}$  of distilled water, into a receiver containing 100 of distilled water; when gas ceases to be evolved, the receiver should be loosely corked, and shaken until the chlorine is absorbed.

The product is a yellowish-green liquid, with a strong odour of chlorine. Specific gravity, 1.003. It immediately discharges the colour of a diluted solution of sulphate of indigo. It should contain rather more than 0.5 per cent. of chlorine, and leave no residue on evaporation.

Solution of chlorine is used as a lotion for foul ulcers, and, diluted with 6 or 8 parts of water, as a gargle in scarlatina, tonsillitis, diphtheria, septic sore throat, and mercurial pyalism. As an inhalation it has been used in phthisis and in chronic bronchitis (see Vapor Chlorig). Mixed with one-twelfth of its volume of syrup of orange and 2 grains of quinine sulphate to each fluid ounce, it

forms *Mistura Chlori cum Quinina* (Burney Yeo), which is given in doses of 1 fluid ounce. Solution of chlorine should be freshly made as required, and transferred to well-stoppered, amber-coloured bottles, which should be kept in a cool, dark place. *Gargarisma Chlori* is more readily prepared, and will be found preferable in many instances.

*Dose*.—3 to 12 decimils (15 to 20 minims), well diluted.

NOTES.—*Liquor Chlori Compositus*, U.S.P., is prepared by the following process:—Add 1·8 of hydrochloric acid (31·9 per cent.), diluted with 2 of distilled water, to 0·5 of potassium chlorate, contained in a flask fitted with a stopper perforated to admit a funnel containing 10 grammes of purified cotton, well wetted with cold water; place the flask containing the mixture on a water-bath containing boiling water for two to three minutes, after which remove it from the water-bath, pass 50 of cold distilled water through the cotton in the funnel, and stopper the flask so that it can be inverted and the contents shaken thoroughly; then add another 50 of cold distilled water through the cotton in the funnel, and again shake thoroughly. Compound solution of chlorine should be freshly made as required. The average dose of the preparation is 4 mils (1 fluid drachm).

### LIQUOR COCCI.

SOLUTION OF COCHINEAL.

*Synonym*.—Liquid Cochineal.

Cochineal	...	...	...	...	20·00
Potassium Carbonate	...	...	...	...	1·00
Potassium Citrate	...	...	...	...	10·00
Alcohol	...	...	...	...	20·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the potassium carbonate in 60 of the distilled water, and digest the unbruised cochineal in the solution on a water-bath for six hours or until exhausted; then strain, cool, add the alcohol and potassium citrate, and make up the required volume with distilled water. The product is a somewhat thick, dark crimson liquid.

Solution of cochineal is used to colour mixtures, lotions, mouth washes, etc., and it is also employed in culinary operations. It imparts a rose-pink or crimson colour to neutral or alkaline liquids, and a scarlet colour to acid liquids. This solution mixes more readily, and imparts a more brilliant colour, than ordinary solutions of cochineal. If desired the alcohol may be replaced by glycerin (see *Glycerinum Cocci*). The glycerin of cochineal will be found preferable in certain cases.

### LIQUOR COPAIBÆ.

SOLUTION OF COPAIBA.

*Synonym*.—Soluble Copaiba.

Copaiba	...	...	...	...	50·00
Distilled Water	...	...	...	...	25·00
Solution of Potash, sufficient to produce	...	...	...	...	100·00

Add the copaiba to 75 of the solution of potash, boil for an hour, then add the water, mix thoroughly, and allow to cool; separate the



clear liquid from the oil and sediment, evaporate to 95, add sufficient solution of potash to make up the required volume, and filter through kieselguhr. The product is a brownish-yellow or reddish, syrupy liquid, with a peculiar aromatic odour, and a persistent alkaline and acrid taste.

Solution of copaiba is used as a diuretic, and an antiseptic to the genito-urinary tract.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

### LIQUOR COPAIBÆ ET BUCHU ET CUBEBÆ.

SOLUTION OF COPAIBA, BUCHU, AND CUBEBS.

Solution of Copaiba	...	...	...	80·00
Liquid Extract of Buchu	...	...	...	10·00
Liquid Extract of Cubebs	...	...	...	10·00

Mix the liquid extracts with the solution of copaiba, and filter through kieselguhr.

This mixture is diaphoretic, diuretic, and antiseptic, and is used in gonorrhœa and gleet.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

### LIQUOR COPAIBÆ ET BUCHU ET CUBEBÆ CUM SANTALO.

SOLUTION OF COPAIBA, BUCHU, AND CUBEBS, WITH SANDAL WOOD.

Solution of Copaiba, Buchu, and Cubebs	...	...	...	80·00
Oil of Sandal Wood	...	...	...	10·00
Oil of Cassia	...	...	...	0·50
Alcohol, sufficient to produce	...	...	...	100·00

Mix the oils of sandal wood and cassia with the alcohol, add the solution of copaiba, buchu, and cubebs, and filter through kieselguhr.

This mixture is antiseptic and diuretic, and, as all the active ingredients are excreted by the kidneys, it is of especial use in sub-acute and chronic gonorrhœa and gleet.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

### LIQUOR COPAIBÆ ET SANTALI.

SOLUTION OF COPAIBA AND SANDAL WOOD.

Solution of Copaiba	...	...	...	80·00
Oil of Sandal Wood	...	...	...	10·00
Oil of Cassia	...	...	...	0·50
Alcohol, sufficient to produce	...	...	...	100·00

Mix the oils of sandal wood and cassia with the alcohol, add the solution of copaiba, and filter through kieselguhr.

This mixture combines the disinfectant action of oil of sandal wood with the diuretic action of copaiba.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

**LIQUOR COSCINII CONCENTRATUS.**

CONCENTRATED SOLUTION OF COSCINIUM.

Coscinium, in No. 5 powder	...	...	...	50·00
Alcohol	...	...	...	40·00
Distilled Water, sufficient to produce	...	...	...	100·00

This solution is prepared in the same way as *Liquor Calumbæ Concentratus*, but the proportion of water used in macerating may be varied according to the condition of the powder, provided the drug is fairly exhausted and that the final product measures 100.

Concentrated solution of coscinium is official in India and the Eastern Colonies, where it is used as an equivalent of the corresponding preparation of calumba. Its action is that of a simple bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR CRESOLIS COMPOSITUS.**

COMPOUND SOLUTION OF CRESOL.

*Synonym.*—*Liquor Cresoli Saponatus.*

Cresylic Acid, by weight	...	...	...	50·00
Linseed Oil, by weight	...	...	...	35·00
Potassium Hydroxide	...	...	...	8·00
Alcohol	...	...	...	4·00
Distilled Water, sufficient to produce, by weight	...	...	...	100·00

Heat the linseed oil to a temperature of about 70°, add the potassium hydroxide dissolved in 5 of the water, and mix thoroughly; then add the alcohol, and continue heating without stirring until a small portion of the mixture is found to be soluble in boiling water without the separation of oily drops. Finally, dissolve the cresylic acid in this soap without heat, and add sufficient distilled water to produce the required weight.

Compound solution of cresol is used chiefly as an antiseptic for external use. Cresol is a more powerful germicide than carbolic acid, and is less toxic to mammals.

*NOTE.*—This preparation corresponds to *Liquor Cresoli Saponatus*, Ph.G., and only differs from *Liquor Cresolis Compositus*, U.S.P., by containing alcohol.

**LIQUOR CREOSOTI.**

SOLUTION OF CREOSOTE.

*Synonyms.*—*Aqua Creosoti*; *Creosote Water.*

Creosote	...	...	...	...	1·00
Distilled Water	...	...	...	...	100·00

Add the creosote to the distilled water, shake vigorously, and filter through a well-wetted filter.

Solution of creosote should be freshly prepared as required. It is used in gastric fermentation and dyspepsia.

*Dose.*—4 to 12 mils (1 to 3 fluid drachms).

*NOTE.*—This preparation corresponds to *Aqua Creosoti*, U.S.P.

**LIQUOR CUSPARIÆ CONCENTRATUS.**

## CONCENTRATED SOLUTION OF CUSPARIA.

Cusparia Bark, in No. 40 powder	...	...	50'00
Alcohol (20 per cent.), sufficient to produce	...	...	100'00

This solution is prepared in the same way as Liquor Andrographidis Concentratus.

The action of this preparation is that of an aromatic bitter. Infusum Cuspariæ Concentratum is a more satisfactory product.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR DUODENALIS.**

## DUODENAL SOLUTION.

*Synonyms.*—Liquor Secretini; Solution of Secretin.

Duodenal solution is prepared from the cleansed duodenal membrane of the ox, pig, or sheep, by scraping off the membrane with a blunt knife, weighing, triturating with sand, and extracting with four times its weight of 0.4 per cent. hydrochloric acid. The mixture is boiled over a free flame, and, while still boiling, neutralised with sodium hydroxide or sodium carbonate. Most of the proteids present are thus precipitated, and the supernatant liquid, which contains the secretin, is decanted, strained through a cloth, and afterwards filtered. In order to free it further from traces of gelatin and proteid, the solution may be precipitated by a mixture of absolute alcohol and ether. The secretin is not thrown down, and the alcohol-ether may be removed by evaporation. Distilled water is added to the liquid until a solution containing the equivalent of 10 per cent. of the original mucous membrane is obtained.

Prepared as described, the solution of secretin remains extremely active for twenty-four hours, after which it quickly loses its activity. The deterioration may be retarded, however, for some weeks if it is kept in the dark, slightly acid, and sterile, in which case it must be neutralised by sodium carbonate before injection. A solution of secretin obtained from any animal will, on injection into any other animal, evoke a secretion in the latter of pancreatic juice.

Duodenal solution is most active when injected hypodermically, but it has also been given by the mouth, and is apparently not affected by the gastric juice.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**LIQUOR EPISPASTICUS.**

## BLISTERING LIQUID.

Cantharides, in No. 20 powder	...	...	50'00
Acetic Ether, sufficient to produce	...	...	100'00

Moisten the drug with 25 of the acetic ether, pack in a percolator, and set aside for twenty-four hours; then slowly percolate with sufficient of the menstruum to produce the required volume.



Blistering liquid is painted on the skin as a vesicant to relieve inflammation of deep-seated parts—on the chest for pleurisy, over the pericardium in pericarditis, over the mastoid process in inflammation of the ear, over the painful nerve in neuralgia. The area painted is not usually much larger than a shilling-piece; the blister may be pricked with a sterilised needle, and a little soft boric ointment applied. The use of preparations of cantharides should be avoided in children, the aged, and in those suffering from renal disease, since absorption of cantharidin may set up or increase kidney irritation.

NOTE.—A more uniform product (Liquor Epispasticus cum Oleo) can be obtained by dissolving 0·35 of cantharidin, 2 of castor oil, and 1 of resin, in sufficient acetic ether to produce 100 by volume.

### LIQUOR EPISPASTICUS CONCENTRATUS.

#### CONCENTRATED BLISTERING LIQUID.

Cantharides, in No. 20 powder	...	...	100·00
Acetic Ether, sufficient to produce	...	...	100·00

Exhaust the drug by repercolation with acetic ether, standardise, and adjust so that the finished product shall contain 0·5 per cent. of cantharidin.

This preparation forms a convenient substitute for cantharides in making various preparations.

### LIQUOR EPISPASTICUS MYLABRIDIS.

#### BLISTERING LIQUID OF MYLABRIS.

Mylabris, in No. 20 powder	...	...	50·00
Acetic Ether, sufficient to produce	...	...	100·00

Blistering liquid of mylabris is prepared in the same way as Liquor Epispasticus.

This blistering liquid is official in India and the African and Eastern Colonies, where it is employed for the same purposes as blistering liquid prepared with cantharides.

### LIQUOR ETHYL NITRITIS.

#### SOLUTION OF ETHYL NITRITE.

Solution of ethyl nitrite is prepared by dissolving ethyl nitrite, obtained by the interaction of alcohol, sodium nitrite, and diluted sulphuric acid at a low temperature, in a mixture of 95 of absolute alcohol and 5 of glycerin. The product should contain from 2½ to 3 per cent. by weight of ethyl nitrite.

It is a transparent, colourless or pale yellow, limpid, volatile, inflammable liquid, with a characteristic apple-like taste and odour. Specific gravity, 0·823 to 0·826. If an acidulated strong solution of ferrous sulphate be placed in a test tube, and solution of ethyl nitrite added, a deep olive-brown colouration ( $\text{FeSO}_4, 2\text{NO}$ ) appears

where the two liquids come in contact. The solution should be free from acid and aldehyde.

Solution of ethyl nitrite is a more stable preparation than spirit of nitrous ether and equally efficacious. It is gradually hydrolysed by contact with water, and should only be diluted at the time of taking the dose. It is a diaphoretic and diuretic, having the general properties of the nitrites in reducing blood pressure by dilating the arterioles. The solution is employed in place of Spiritus Etheris Nitrosi for colds and feverish conditions, and to dilate the blood vessels in cases of cardiac pain.

*Dose.*—1 to 4 mls (20 to 60 minims).

### LIQUOR EUONYMINI.

#### SOLUTION OF EUONYMIN.

Dry Extract of Euonymus	...	...	...	6.00
Oil of Coriander	...	...	...	0.75
Alcohol (45 per cent.), sufficient to produce	...	...	...	100.00

Macerate the extract with 50 of the alcohol in a closed vessel for four days, then add the oil of coriander, filter, and pass sufficient of the alcohol through the filter to produce the required volume.

Solution of euonymin has a mild aperient action, and, after absorption, an effect on the heart like digitalis. It is supposed to be a cholagogue.

*Dose.*—1 to 2 mls (15 to 30 minims).

### LIQUOR EUONYMINI ET CASCARÆ.

#### SOLUTION OF EUONYMIN AND CASCARA.

Dry Extract of Euonymus	...	...	...	3.50
Alcohol (60 per cent.), a sufficient quantity.	...	...	...	
Tasteless Liquid Extract of Cascara Sagrada,	...	...	...	
sufficient to produce	...	...	...	100.00

Macerate the extract of euonymus with 25 of the alcohol in a closed vessel for four days, then filter, wash the filter with sufficient of the alcohol to produce 25, and add sufficient tasteless liquid extract of cascara to make up the required volume.

This preparation is employed as an aperient in chronic constipation.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### LIQUOR EUONYMINI ET IRIDINI.

#### SOLUTION OF EUONYMIN AND IRIDIN.

Dry Extract of Euonymus	...	...	...	3.50
Iridin	...	...	...	1.75
Potassium Carbonate	...	...	...	1.50
Distilled Water	...	...	...	25.00
Alcohol (60 per cent.), sufficient to produce	...	...	...	100.00

Macerate the extract with 50 of the alcohol in a closed vessel for four days, and dissolve the iridin and potassium carbonate in the distilled water by warming; mix the two liquids, filter the mixture, and pass sufficient of the alcohol through the filter to produce the required volume.

This solution is used as a purgative, and is generally supposed to augment the secretion of bile by increasing the activity of the liver.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### LIQUOR FERRI ACETATIS.

#### SOLUTION OF FERRIC ACETATE.

Solution of Ferric Sulphate	...	...	12.50
Solution of Ammonia, a sufficient quantity.			
Glacial Acetic Acid, liquefied	...	...	7.50
Distilled Water, sufficient to produce		...	100.00

Dilute the solution of ferric sulphate with 100 of the water, add it gradually to 20 of solution of ammonia, previously mixed with 100 of distilled water, stir thoroughly, taking care to keep the ammonia in slight excess, and set aside for two hours, with occasional stirring; collect the precipitated ferric hydroxide on a calico filter, wash it with distilled water until free from sulphates, allow to drain, remove superfluous moisture by squeezing the filter, dissolve the hydroxide in the acid, and add sufficient water to make up the required volume. The solution should be allowed to stand until clear, and then decanted from any insoluble matter deposited.

It is a red liquid with a sour, astringent taste and vinegar-like odour. Specific gravity, 1.031. It should be free from lead, copper, arsenium, zinc, calcium, sodium, potassium, ammonium, nitrates and ferrous salts, and almost free from sulphates. The solution is incompatible with alkalies and with alkali carbonates and salicylates.

This solution has an astringent action externally, and is used as a paint in chronic pharyngitis and tonsilitis. It is also astringent in the stomach and intestines, and has been employed in atonic dyspepsia and diarrhœa. It is employed occasionally in kidney disease when a diuretic and hæmatinic action is required, and has also been recommended in full doses in pneumonia. Its incompatibles are the same as those of *Liquor Ferri Perchloridi*.

*Dose.*—3 to 10 decimils (5 to 15 minims).

NOTES.—*Liquor Ferri et Ammonii Acetatis*, U.S.P., is prepared by adding 6 of diluted acetic acid (6 per cent.), 4 of tincture of ferric chloride (13.28 per cent.  $\text{FeCl}_3$ ), 12 of aromatic elixir, and 12 of glycerin, in the order named, to 50 of non-alkaline solution of ammonium acetate (7 per cent.), the volume being subsequently made up to 100 by the addition of water. The average dose of this solution of iron and ammonium acetate is 16 mils (4 fluid drachms). The preparation should be freshly made as required. It is given as a diuretic and diaphoretic, and has been found useful in anæmia and chronic parenchymatous nephritis.



**LIQUOR FERRI ACETATIS FORTIOR.**

STRONGER SOLUTION OF FERRIC ACETATE.

Solution of Ferric Sulphate	...	...	...	50'00
Solution of Ammonia, a sufficient quantity.				
Glacial Acetic Acid, liquefied	...	...	...	30'00
Distilled Water, sufficient to produce			...	100'00

Dilute the solution of ferric sulphate with 200 of the water, add it gradually to 80 of the solution of ammonia previously mixed with 200 of distilled water, stir thoroughly, taking care to keep the ammonia in slight excess, and set aside for two hours, with occasional stirring; collect the precipitated ferric hydroxide on a calico filter, wash it with distilled water until free from sulphates, allow to drain, remove superfluous moisture by pressing the filter, dissolve the hydroxide in the acid, and add sufficient distilled water to make up the required volume. The solution should be allowed to stand until clear, and then decanted from any insoluble matter deposited.

It is a dark red liquid with similar characters to Liquor Ferri Acetatis, and should be free from the same impurities.

Stronger solution of ferric acetate was formerly official. It is used for the preparation of Tinctura Ferri Acetatis, and may be diluted with three times its volume of distilled water to form Liquor Ferri Acetatis.

*Dose.*— $\frac{1}{2}$  to 5 decimils (1 to 8 minims).

*NOTE.*—Liquor Ferri Acetatis Fortior was official in the British Pharmacopœia, 1885.

**LIQUOR FERRI ALBUMINATI.**

SOLUTION OF FERRIC ALBUMINATE.

*Synonym.*—Solution of Iron Albuminate.

Dried Egg Albumen	...	...	...	4'00
Solution of Ferric Oxychloride	...	...	...	13'00
Solution of Sodium Hydroxide, a sufficient quantity.				
Alcohol	...	...	...	12'50
Aromatic Elixir...	...	...	...	40'00
Distilled Water, sufficient to produce			...	100'00

Dissolve the albumen in 200 of distilled water, strain, add the solution of ferric oxychloride, previously diluted with 200 of distilled water, mix, and exactly neutralise by cautiously adding a sufficient quantity of a mixture prepared by diluting 1·2 by volume of the solution of sodium hydroxide with 10 of distilled water. Rapidly wash the flocculent precipitate with distilled water, by decantation, until the washings give no more than a faint opalescence with solution of silver nitrate, then drain the precipitate, transfer to a porcelain dish, add 1 by weight of solution of sodium hydroxide,

stir, and, while stirring, add sufficient distilled water, but not more than 15, to dissolve the precipitate. Finally add the alcohol and aromatic elixir, previously mixed with sufficient distilled water to make the product measure 100.

It is a dark reddish-brown liquid, with an alkaline reaction. The solution contains the equivalent of about 0.65 per cent. w/v of metallic iron, in the form of albuminate.

This preparation is without astringency, is generally well borne by the stomach, and does not blacken the teeth. The iron is easily split off, and is precipitated by sulphides. It is doubtful if this and like preparations have any advantage over the inorganic preparations of iron. The solution should be prescribed undiluted.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

*NOTE.*—Solutions of iron albuminate are somewhat unstable and prone to deposit.

## LIQUOR FERRI DIALYSATI.

### SOLUTION OF DIALYSED IRON.

Strong Solution of Ferric Chloride	...	...	25.00
Solution of Ammonia, a sufficient quantity.			
Distilled Water, sufficient to produce	...	...	100.00

Mix 21.5 of the solution of ferric chloride with 143 of distilled water, add an excess of solution of ammonia, stir thoroughly, filter through calico, wash the precipitated ferric hydroxide with distilled water, squeeze to remove superfluous moisture, add the hydroxide to the remainder of the solution of ferric chloride, and again stir thoroughly; warm gently until solution is effected, filter if necessary, then place the liquid in a covered dialyser, and allow dialysis to proceed in a stream of water until the solution is almost tasteless. The resulting solution should measure 100.

It is a clear, dark reddish-brown neutral liquid, free from any marked ferruginous taste. Specific gravity about 1.047. The solution should yield 5 per cent. of ferric oxide.

Solution of dialysed iron is a non-irritating hæmatinic without astringency, and is given where astringent salts of iron tend to derange the stomach. It should be prescribed undiluted, the dose being added to water at the time of taking; or it may be ordered with 2 parts of glycerin, which forms a stable solution, sometimes known as Glycerinum Ferri Dialysati. When prescribed with Liquor Arsenicalis the solutions should each be well diluted with water before mixing.

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims).

*NOTES.*—Liquor Ferri Dialysati was official in the British Pharmacopœia, 1885. It is an excellent antidote for poisoning by arsenic, being given for that purpose in doses of 30 mls (1 fluid ounce).

**LIQUOR FERRI HYPOPHOSPHITIS FORTIS.**

STRONG SOLUTION OF IRON HYPOPHOSPHITE.

Solution of Ferric Sulphate	...	...	...	14'20
Solution of Ammonia	...	...	...	23'00
Citric Acid	...	...	...	7'60
Sodium Hypophosphite	...	...	...	9'60
Sodium Citrate	...	...	...	6'60
Distilled water, a sufficient quantity.				
Chloroform Water (1 in 200), sufficient to produce	...	...	...	100'00

Dilute the solution of ammonia with an equal volume of distilled water, gradually add the solution of ferric sulphate previously diluted with an equal volume of water, wash the precipitated ferric hydroxide by decantation with distilled water till free from sulphates, collect on a calico filter, drain, and transfer the moist precipitate to a porcelain dish; add the citric acid and 20 of distilled water, heat over a water-bath, with occasional stirring, until a clear solution results, then add the sodium hypophosphite, continue the heating on the water-bath with stirring for about one minute, or until a clear greenish solution is obtained, add the sodium citrate, filter, and pass sufficient chloroform water (1 in 200) through the filter to make up the required volume.

This is a permanent solution for use in the preparation of Syrupus Ferri Hypophosphitis and Syrupus Hypophosphitum Compositus.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims).

**LIQUOR FERRI IODIDI FORTIS.**

STRONG SOLUTION OF FERROUS IODIDE.

Iron, in wire	...	...	...	20'00
Iodine	...	...	...	66'50
Diluted Hypophosphorous Acid	...	...	...	7'50
Distilled Water, sufficient to produce	...	...	...	100'00

Place the iron wire and the iodine in a small flask with 80 of the distilled water; then plug the neck with cotton wool, and allow the reaction to proceed until the liquid loses its brown colour. Heat the solution to boiling-point, cool, filter through starch-free filter paper into the diluted hypophosphorous acid, and pass sufficient previously boiled and cooled distilled water through the filter to produce the required volume. The product is a green liquid, having a strongly ferruginous taste, and containing 80 per cent. w/v of ferrous iodide.

Solution of ferrous iodide is used to prepare extemporaneously a syrup corresponding in strength to Syrupus Ferri Iodidi, one volume being diluted with seven volumes of syrup for this purpose.

*Dose.*—1 to 5 decimils (2 to 8 minims).

*NOTES.*—This preparation should be kept in small bottles, which are quite ull and exposed to the light, the neck and corks being dipped into melted paraffin. A small proportion of hypophosphorous acid is sometimes added to improve the keeping properties of the solution.



**LIQUOR FERRI OXYCHLORIDI.**

## SOLUTION OF FERRIC OXYCHLORIDE.

*Synonyms.*—Soluble Peroxide of Iron; Solution of Chloroxide of Iron; Solution of Basic Ferric Chloride.

Strong Solution of Ferric Chloride, by weight	22.50
Solution of Ammonia, by weight	... .. 35.00
Hydrochloric Acid, by weight...	... .. 2.35
Distilled Water, sufficient to produce, by weight	... .. 100.00

Dilute the solution of ammonia with 320 of distilled water, and add slowly, with constant stirring, the strong solution of ferric chloride, previously diluted with 160 of distilled water. Allow the precipitate to subside, and wash it repeatedly with distilled water until the washings produce only a faint opalescence with solution of silver nitrate; then drain the precipitate on a cloth, remove excess of moisture by pressure, and mix the hydrochloric acid with the precipitate. Stir the mixture at intervals during three days, then heat if necessary to about 40° to complete solution, and add sufficient distilled water to make the product weigh 100.

It occurs as a brownish-red, clear, or nearly clear, solution, containing the equivalent of about 3.5 per cent. of metallic iron. The solution has an acid reaction and a slightly astringent taste. Miscible with water, diluted alcohol, and sugar solutions without becoming turbid. Concentrated salt solution precipitates ferric hydroxide, and so do the fixed alkalies and ammonia. Potassium ferrocyanide produces a blue, and tannic acid a black, precipitate. The solution gelatinises after frequent heating, and also in the cold on addition of a trace of sulphuric acid, alkalies, carbonates, or sulphates of the alkalies. It is not affected by small quantities of hydrochloric or nitric acids. With solution of albumen, a rusty-coloured precipitate of ferric albuminate is formed if the solution is perfectly neutral.

This preparation possesses a very mild astringency, and is much more stable than *Liquor Ferri Dialysati*. It is employed as a hæmatinic and is best diluted with glycerin and water (1 part and 3 parts).

*Dose.*—6 to 18 decimils (10 to 30 minims).

*NOTE.*—This preparation corresponds in strength to *Liquor Ferri Oxychlorati* of the German Pharmacopœia.

**LIQUOR FERRI PEPTONATI.**

## SOLUTION OF IRON PEPTONATE.

*Synonym.*—Solution of Peptonised Iron.

Peptone, in powder	... .. 4.00
Solution of Ferric Oxychloride	... .. 20.00
Solution of Sodium Hydroxide, a sufficient quantity.	
Alcohol	... .. 12.50
Aromatic Elixir...	... .. 40.00
Distilled Water, sufficient to produce	... .. 100.00

Dissolve the peptone in 200 of distilled water, add the solution of ferric oxychloride, previously diluted with 200 of distilled water, and exactly neutralise by cautiously adding a sufficient quantity of a mixture prepared by diluting 1·2 by volume of the solution of sodium hydroxide with 10 of distilled water. Rapidly wash the flocculent precipitate with distilled water, by decantation, until the washings give no more than a faint opalescence with a solution of silver nitrate, drain the precipitate, transfer to a porcelain dish, add 1·4 by weight of solution of sodium hydroxide, stir, and while stirring, add sufficient distilled water, but not more than 15, to dissolve the precipitate. Finally add the alcohol and aromatic elixir, previously mixed with sufficient distilled water to make the product measure 100.

It is a dark reddish-brown, non-astringent liquid, containing the equivalent of about 0·65 per cent. w/v of metallic iron, in the form of peptonate.

This solution does not upset digestion or blacken the teeth, but it possesses little if any advantage over the scale preparations of iron. It is sometimes given with the addition of 0·5 per cent. of quinine hydrochloride (*Liquor Ferri Peptonati cum Quinina*).

*Dose*.—4 to 15 mls (1 to 4 fluid drachms).

*NOTE*.—Solutions of peptonised iron are somewhat unstable and should be prescribed without further dilution.

### LIQUOR FERRI PEPTONATI CUM MANGANO.

SOLUTION OF IRON PEPTONATE WITH MANGANESE.

*Synonym*.—Solution of Peptonised Iron with Manganese.

Manganese Chloride	...	...	...	...	0·35
Solution of Iron Peptonate, sufficient to produce	...	...	...	...	100·00

Dissolve the manganese chloride in the solution of iron peptonate.

This mixture is used in anæmia and chlorosis. There is no reason to suppose that it possesses any advantage over the inorganic preparations of iron.

*Dose*.—4 to 15 mls (1 to 4 fluid drachms).

### LIQUOR FERRI PERCHLORIDI.

SOLUTION OF FERRIC CHLORIDE.

*Synonyms*.—Solution of Iron Chloride; *Liquor Stypticus*.

Strong Solution of Ferric Chloride	...	...	25·00
Distilled Water, sufficient to produce	...	...	100·00

Add sufficient water to the strong solution of ferric chloride to make up the required volume. Specific gravity, 1·11.

Solution of ferric chloride is a styptic and astringent, and is used in the treatment of chronic pharyngitis and tonsillitis. Taken internally

it may be serviceable in atonic dyspepsia and diarrhœa. It cannot be used for long periods, as is required in the treatment of anæmia, on account of the astringency. It may be prescribed with the infusions of quassia and calumba, but is incompatible with vegetable infusions containing tannin; also with alkalies and their carbonates, iodides, salicylates, and mucilage of acacia. Glycerin masks the taste of the chloride better than syrup. *Mistura Ferri Ammoniata* is a useful non-astringent preparation of ferric chloride.

*Dose*.—3 to 10 decimils (5 to 15 minims).

NOTE.—This solution and *Tinctura Ferri Perchloridi* contain identical proportions of ferric chloride.

### LIQUOR FERRI PERCHLORIDI FORTIS.

STRONG SOLUTION OF FERRIC CHLORIDE.

*Synonym*.—Strong Solution of Iron Chloride.

Strong solution of ferric chloride is prepared by gently heating 24 of iron with 75 of hydrochloric acid diluted with 42 of distilled water, until effervescence ceases, then boiling, filtering, rinsing the flask with a little water, pouring the washings over the filter, mixing the filtrate with 42 of hydrochloric acid, and pouring the solution in a slow continuous stream into 9 of nitric acid, heating, if necessary, to promote chemical action. After evaporating the product until no more nitrous fumes are evolved and a precipitate begins to form, add 6 of hydrochloric acid, and sufficient distilled water to produce 105 by volume.

The solution is an orange-brown liquid with a strongly astringent taste. Specific gravity about 1.42. It should be free from lead, copper, arsenium, zinc, calcium, sodium, potassium, ammonium, nitrates, and ferrous salts.

Strong solution of ferric chloride is employed chiefly in the preparation of the weaker solution and of the tincture. It is used locally as a styptic to arrest bleeding from small wounds, and has been employed in post-partum hæmorrhage, but in some cases the coagula have found their way into the blood stream and caused death. The treatment of aneurism by injecting ferric chloride into the sac is also open to the same objection, and its use as an injection into hæmorrhoids, varicose veins, and nævi is nearly obsolete. Mixed with 3 parts of glycerin it is used as a paint for the throat; on account of its acidity, however, a solution made from the solid ferric chloride (1 in 5) is often preferred.

NOTES.—It is officially stated that this solution contains 22.5 per cent. w/v of iron in the form of chloride, and that 5 cubic centimetres (mils), determined gravimetrically, should yield 1.6 grammes of ferric oxide ( $\text{Fe}_2\text{O}_3$ ), but this proportion of oxide can only be obtained from a solution having the specific gravity 1.49. *Liquor Ferri Chloridi*, U.S.P., contains not less than 29 per cent. of anhydrous ferric chloride, corresponding to 10 per cent. of metallic iron, its specific gravity is about 1.315 at 25°, and the average dose of the solution is 1 decimil (1½ minims). Test solution of ferric chloride is prepared by dissolving 5 of the anhydrous salt in sufficient distilled water to produce 100 by volume.



**LIQUOR FERRI PERNITRATIS.****SOLUTION OF FERRIC NITRATE.**

Solution of ferric nitrate is prepared by adding 3.5 of iron to 15.75 of nitric acid, previously diluted with 56 of water, and setting aside until solution is effected, avoiding too violent a reaction by the addition of a little more water, if necessary; when solution is complete the liquid is filtered, and sufficient distilled water added to produce 105 by volume.

The solution is a reddish-brown liquid with an acid, astringent taste. Specific gravity, 1.107. Determined gravimetrically it should yield 4.6 per cent. w/v of ferric oxide.

Solution of ferric nitrate has properties resembling those of Liquor Ferri Perchloridi, but it is seldom employed.

*Dose.*—3 to 10 decimils (5 to 15 minims).

**LIQUOR FERRI PERSULPHATIS.****SOLUTION OF FERRIC SULPHATE.**

Solution of ferric sulphate is prepared by diluting 6.75 of sulphuric acid with 90 of water, and dissolving 72 of ferrous sulphate in the mixture by the aid of heat; then diluting 6.75 of nitric acid with 18 of water, warming, adding the solution of ferrous sulphate, and boiling until, after the sudden evolution of ruddy fumes, the liquid becomes red. The product should be tested for the presence of ferrous salt, and, if any remain, a little nitric acid should be added, the liquid boiled, and sufficient distilled water added to produce 99 by volume.

The solution is a dark red liquid with a very astringent taste. Specific gravity, 1.441; determined gravimetrically it should yield 20.8 per cent. w/v of ferric oxide.

Solution of ferric sulphate is employed in making the scale preparations of iron.

*NOTES.*—Liquor Ferri Tersulphatis, U.S.P., contains about 36 per cent. of normal ferric sulphate, and its specific gravity is about 1.432 at 25°. Liquor Ferri Subsulphatis, U.S.P., is an aqueous solution of variable chemical composition, containing an amount of basic ferric sulphate corresponding to not less than 13.57 per cent. of metallic iron; the average dose of this solution of ferric subsulphate is 2 decimils (3 minims). Specific gravity, about 1.548 at 25°.

**LIQUOR FERRI PHOSPHATIS.****SOLUTION OF FERROUS PHOSPHATE.**

Solution of ferrous phosphate is prepared by placing 6.75 of iron wire and 50 of concentrated phosphoric acid, previously diluted with half its volume of water, in a flask, heating gently until the iron is dissolved, adding sufficient distilled water to produce 100 by volume, and filtering.

It is a clear, pale green, odourless liquid, with a strongly ferruginous taste, and contains 20.19 per cent. w/v of hydrous ferrous phosphate,  $\text{Fe}_3\text{2PO}_4, 8\text{H}_2\text{O}$ .

Solution of ferrous phosphate is used for the extemporaneous production of Syrupus Ferri Phosphatis and Syrupus Ferri Phosphatis cum Quinina et Strychnina.

NOTE.—This preparation is best kept in small bottles, which should be quite full.

### LIQUOR FORMALDEHYDI.

SOLUTION OF FORMALDEHYDE.

*Synonym.*—Solution of Formic Aldehyde.

Solution of formaldehyde is prepared by dissolving in water formic aldehyde obtained by the careful oxidation of methyl alcohol, and usually contains from 36 to 38 per cent. by weight of absolute formic aldehyde.

It occurs as a transparent, colourless liquid with a pungent odour and caustic taste, neutral or slightly acid to litmus paper, miscible with water and alcohol in all proportions. Specific gravity about 1.08. On mixing with an ammoniacal solution of silver nitrate metallic silver is precipitated. If to 2 mls of the solution an equal volume of solution of sodium hydroxide and 5 decigrams of resorcin be added, and the mixture heated to boiling, the yellow colour at first appearing gradually changes to red. If 5 mls of sulphuric acid be mixed with a little salicylic acid, and two drops of formaldehyde added, a deep red colour is formed; 10 mls should not require more than 25 centimils of normal solution of sodium hydroxide for neutralisation, with phenol-phthalein as indicator (limit of formic acid); 3 mls evaporated to dryness on a water-bath leaves a white residue of paraformaldehyde, which should disappear on ignition. If 1 mil be mixed with 20 mls of solution of iodine, and sodium carbonate added, with shaking, until the solution is colourless, no precipitate should be formed, nor should an odour of iodoform be developed. Diluted with 3 parts of water it should give no reactions with tests for chlorides, sulphates, copper or other metals. Solution of formaldehyde may be assayed in the following way:—Introduce a solution of 2 grammes of pure neutral ammonium chloride in 25 mls of water into a flask having a well-fitting stopper. Add 2.25 grammes of the sample, then 25 mls of normal solution of sodium hydroxide, immediately stopper the flask, and set aside for one hour. Add a few drops of litmus solution, and determine the excess of alkali with normal solution of sulphuric acid; each mil of normal solution of sodium hydroxide used represents 2 per cent. of formaldehyde in the sample. The iodometric method, however, is considered more accurate, and is performed as follows:—To a quantity of the solution containing about 15 milligrams of formaldehyde add 25 mls of iodine solution (N/10) and sufficient 10 per cent. solution of sodium hydroxide to produce a pale yellow colour. After standing for ten minutes a small excess of hydrochloric acid is added and the free iodine titrated with solution of sodium thiosulphate. Two atoms of iodine are consumed by one molecule of formaldehyde. The amount of iodine taken up, multiplied by 0.118, will give the amount of formaldehyde.

Solution of formaldehyde is a powerful germicide, apparently acting by combining with some amide group in the proteid molecule; a  $\frac{1}{2}$  per cent. solution kills most organisms. It is therefore employed for the treatment of wounds and for surgical cleansing, in soapy solution, but it has the disadvantage of being somewhat too irritant for general use. To disinfect rooms, the solution may be used with a spray, or the solid polymer (see Paraform) vapourised with a suitable lamp. It is stated that the gas liberated from 5 ounces of the solution is sufficient to completely disinfect 1000 cubic feet of air space, if the room be closed up for ten hours. It does not injure metals or fabrics. It is used as a pigment or spray in diphtheria and ozoena (2 per cent.), as a paint in lupus, cancerous growths, or ringworm, 1 part with 3 parts of glycerin; and as an antiseptic gargle or mouth wash, 1 part in 400. Solution of formaldehyde, 1 part, with chloroform, 1 part, and alcohol, 2 parts, is recommended as an inhalation in phthisis, five to ten drops being sprinkled on cotton wool. A 2 per cent. aqueous solution is a preservative of pathological specimens, being preferable to alcohol in that the specimens retain their colour. A 4 per cent. solution is used as a hardening agent for microscopical purposes. Solution of formaldehyde is incompatible with ammonia and all oxidising substances, and renders gelatin insoluble. Advantage is taken of the last-mentioned fact to prepare glutoid capsules and pill coatings, the gelatin being dipped once or twice into the solution of formaldehyde, and allowed to dry. In cases of poisoning by formaldehyde, the stomach-pump or an emetic should be used, and sal volatile administered.

NOTES.—Solution of formaldehyde should be kept in well-stoppered bottles, in a cool place, protected from light. It is frequently sold as 40 per cent., but, in solutions of greater concentration than 38 per cent., the formic aldehyde tends to become converted into the solid polymer, paraformic aldehyde, to prevent the deposition of which, solution of formaldehyde usually contains some methyl alcohol. In the concentrated form, the solution is a powerful caustic, and it should therefore be handled with care. Preparations known under the trade-names Formalin, Formol, Formochlorol, and Formalith are understood to be strong solutions of formic aldehyde.

## LIQUOR GUTTA PERCHA.

### SOLUTION OF GUTTA PERCHA.

*Synonym.*—Traumaticin.

Gutta Percha, in thin slices	...	...	10'00
Lead Carbonate, in fine powder	...	...	10'00
Chloroform, sufficient to produce, by weight	...	...	100'00

Add the gutta percha to 60 of the chloroform in a stoppered bottle, and shake frequently until solution is effected. Then add the lead carbonate, previously mixed with the remainder of the chloroform, shake thoroughly several times, and set aside until the insoluble matter has subsided. Finally, decant the clear liquid and keep it in a well-stoppered bottle.

This preparation is employed for the close application of medic-



aments, such as chrysarobin, to the skin; on evaporation, a dry elastic film remains.

NOTES.—Liquor Gutta Percha, B.P. 1885, was prepared as above, with 12.5 of gutta percha, and 100 by volume of chloroform. A stronger solution of gutta percha (Liquor Gutta Percha Fortior), containing 20 per cent. of gutta percha, is a more viscid preparation, and is preferred by many dermatologists.

## LIQUOR HAMAMELIDIS.

### SOLUTION OF HAMAMELIS.

*Synonyms.*—Aqua Hamamelidis; Hamamelis Water.

Hamamelis Leaves, fresh	...	...	...	100.00
Water	...	...	...	200.00
Alcohol	...	...	...	20.00

Macerate in a still for twenty-four hours, and distil one-half.

A clear, colourless liquid, having a faint agreeable odour.

It is used externally as a mild antiseptic and astringent to small wounds and abrasions. It is applied locally for piles and injected into the rectum, undiluted or mixed with an equal quantity of water.

*Dose.*—4 to 12 mils (1 to 3 fluid drachms).

NOTES.—Some commercial specimens of this preparation have been stated to contain formaldehyde and acetanilide. Aqua Hamamelidis, U.S.P., is prepared by macerating 100 of hamamelis bark in 200 of water for twenty-four hours, then distilling until the distillate measures 85, and adding 15 of alcohol (95 per cent.). Average dose, 8 mils (2 fluid drachms).

## LIQUOR HYDRARGYRI ET AMMONII CHLORIDI.

### SOLUTION OF MERCURY AND AMMONIUM CHLORIDES.

*Synonym.*—Dr. Hart's Solution of Perchloride.

Mercuric Chloride	...	...	...	10.00
Ammonium Chloride	...	...	...	10.00
Tartaric Acid	...	...	...	10.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the mercuric and ammonium chlorides in 80 of the distilled water, add the tartaric acid, and make up to the required volume with distilled water.

This solution is used for antiseptic purposes, 1 fluid drachm being diluted with sufficient water to produce 25 fluid ounces, to form a 1 in 2000 solution of mercuric chloride. The addition of tartaric acid is necessary to prevent precipitation on diluting the solution with ordinary water.

## LIQUOR HYDRARGYRI NITRATIS ACIDUS.

### ACID SOLUTION OF MERCURIC NITRATE.

Acid solution of mercuric nitrate is prepared by dissolving 33 by weight of mercury in 42 by volume of nitric acid previously mixed with 12.5 of distilled water, and boiling gently for fifteen minutes. The solution, when cool, should weigh about 100.

It is a colourless liquid with a strongly acid reaction. Specific gravity about 2.0. It should be free from mercurous salt.

This solution is a strongly corrosive liquid, and is used as a caustic for syphilitic warts, ulcers, lupus patches, etc. It should be carefully applied by means of a glass rod. As a gargle in syphilitic sore throat, 1 or 2 minims are added to each fluid ounce of water.

NOTES.—Acid solution of mercuric nitrate should be kept in a well-stoppered bottle and stored in a dark place. Liquor Hydrargyri Nitratis, U.S.P., is prepared by dissolving 40 of red mercuric oxide in 45 by weight of nitric acid (68 per cent.) previously mixed with 15 of water; this solution of mercuric nitrate contains about 60 per cent. of the salt, and its specific gravity is about 2.086 at 25°. Solution of mercurous nitrate, which is used as a test solution, is prepared by adding 0.5 each of distilled water and nitric acid to 1 of mercury, setting the mixture aside in a cool, dark place for twenty-four hours, then draining the resulting crystals and dissolving them in 100 of distilled water.

### LIQUOR HYDRARGYRI PERCHLORIDI.

#### SOLUTION OF MERCURIC CHLORIDE.

Mercuric Chloride	...	...	...	...	0.114
Distilled Water	...	...	...	...	100.00

Dissolve the mercuric chloride in the distilled water. The product is a clear, colourless liquid, having a persistent metallic taste.

Solution of mercuric chloride provides a convenient means of prescribing mercuric chloride in mixtures. It is incompatible with alkalies and their carbonates, also with solutions of alkaloids or tannin.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTES.—Solution of mercuric chloride contains  $\frac{1}{16}$  grain in 1 fluid drachm. Liquor Hydrargyri Perchloridi, B.P., 1885, contained the same quantity of ammonium chloride, but this was found to be a useless addition. Van Swieten's Solution contains 1 of mercuric chloride in a mixture of 900 of water and 100 of alcohol. Test-solution of mercuric chloride is prepared by dissolving 5 of mercuric chloride in sufficient boiling distilled water to produce 100 by volume, and filtering.

### LIQUOR HYDROGENII PEROXIDI.

#### SOLUTION OF HYDROGEN PEROXIDE.

*Synonyms.*—Aqua Hydrogenii Dioxidii; Solution of Hydrogen Dioxide.

Solution of hydrogen peroxide,  $H_2O_2$ , is obtained by the action of diluted sulphuric or other mineral acid upon barium peroxide, suspended in water, at a temperature below 10°. It should contain about 3 per cent. of hydrogen peroxide, corresponding to nine to eleven volumes of available oxygen.

It is a colourless liquid without odour and with a slightly acid taste. When heated it is decomposed into water and oxygen. If 1 or 2 decimils be added to 8 or 10 mils of water containing  $\frac{1}{2}$  decimil

of solution of potassium chromate, 5 decimils of diluted sulphuric acid, and 2 or 3 mils of ether, a blue layer (perchromic acid) will appear between the ethereal and aqueous liquids, and after agitation the ether will also become blue. The solution should be free from barium, and when evaporated on a water-bath should leave not more than 0.5 per cent. of solid residue. Treated with diluted sulphuric acid and solution of potassium permanganate in a brine-charged nitrometer it should yield eighteen to twenty-two times its own volume of oxygen gas, measured at normal temperature and pressure. For volumetric determination 1 mil of solution of hydrogen peroxide should be diluted with 20 mils of water, 5 mils of diluted sulphuric acid added, and 1 gramme of potassium iodide dissolved in the liquid; after standing a quarter to half an hour, the liberated iodine should be titrated with decinormal solution of sodium thiosulphate.

Solution of hydrogen peroxide owes its efficacy as an antiseptic and disinfectant to the readiness with which it gives up oxygen in presence of organic matter. It does not combine with albumen, and is entirely unirritating and non-poisonous. It is applied locally to wounds, and used to cleanse discharging ulcers, abscesses, venereal sores, and the like. It is also used as drops for the ear, and solutions of 30 and 100 volume strengths are employed in dental practice to cleanse septic cavities, etc. In washing out empyemal or serous cavities, care is necessary on account of the large volume of oxygen rapidly set free. For external use in skin diseases, it may be applied mixed with glycerin and rose water, or a cream may be prepared with anhydrous wool fat and 2 per cent. of the solution. A 1 in 8 solution may be used as a spray to the throat in diphtheria and scarlet fever, and as a disinfectant gargle or mouth wash. As a wash to brush the teeth and destroy dental discharges it is diluted with an equal quantity of water. An injection into the nose (1 in 4) has been found to arrest epistaxis. Solution of peroxide of hydrogen has been recommended for internal use in diabetes, enteric fever, infantile diarrhœa, uræmia, and bronchitis, but there is no evidence of its value in these diseases. It is used to bleach hair and delicate fabrics. Solution of hydrogen peroxide is readily decomposed, and loses strength on keeping. A small proportion of phosphoric acid is commonly added as a preservative, and recently the addition of acetanilide has been recommended for the same purpose. Strong solutions of the peroxide produce irritating "burns" on the skin, but the pain disappears in about an hour and no blister is left.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTES.*—The stability of this solution is ensured by the presence of a slight excess of acid. Solution of hydrogen peroxide is met with in trade as 10, 12, 20, and 30 volume, the number indicating the volume of oxygen obtainable from the preparation. A 100 volume solution is also obtainable and contains 30 per cent. of hydrogen peroxide. In the official gasometric method it is well to use magnesium sulphate solution instead of brine. Aqua Hydrogenii Dioxidii, U.S.P., contains, when freshly prepared, about 3 per cent. by weight of hydrogen peroxide, corresponding to about ten volumes of available oxygen.



**LIQUOR HYPOPHOSPHITUM.**

## SOLUTION OF HYPOPHOSPHITES.

Calcium Hypophosphite	...	...	...	3'50
Sodium Hypophosphite	...	...	...	2'00
Potassium Hypophosphite	...	...	...	1'75
Citric Acid	...	...	...	1'60
Distilled Water, sufficient to produce	...	...	...	100'00

Dissolve the salts and the citric acid in the distilled water; then filter, and pass sufficient distilled water through the filter to make up the required volume.

This is a convenient solution of the hypophosphites without iron or sugar for use in mixture form. It should be noted that the hypophosphites act like any other harmless salts, and are excreted unchanged; the  $\text{PO}_2$  ion has no specific action of importance.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**LIQUOR HYPOPHOSPHITUM COMPOSITUS.**

## COMPOUND SOLUTION OF HYPOPHOSPHITES.

*Synonym.*—Liquor Ferri Hypophosphitis Compositus.

Calcium Hypophosphite	...	...	...	3'50
Magnesium Hypophosphite	...	...	...	1'75
Sodium Hypophosphite	...	...	...	3'50
Strong Solution of Ferric Hypophosphite	...	...	...	30'00
Distilled Water, sufficient to produce	...	...	...	100'00

Dissolve the salts in the strong solution of ferric hypophosphite and distilled water, filter, and pass sufficient distilled water through the filter to make up the required volume.

This solution is employed in place of the hypophosphite syrups when the use of sugar is to be avoided.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**LIQUOR IODI DILUTUS.**

## DILUTED SOLUTION OF IODINE.

*Synonym.*—Liquor Iodi.

Iodine	...	...	...	...	5'00
Potassium Iodide	...	...	...	...	7'50
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the iodine and potassium iodide in the distilled water.

This solution is used, largely diluted with water (1 fluid drachm to 40 fluid ounces), as a vaginal injection. Diluted with 2 or 3 parts of water, it is suitable for injection in spina bifida and hydrocele.

*NOTE.*—This preparation is the same as Liquor Iodi, B.P., 1885. Liquor Iodi Compositus, U.S.P., contains 5 per cent. of iodine and 10 per cent. of potassium iodide; the average dose of this compound solution of iodine is 2 decimils (3 minims).

**LIQUOR IODI FORTIS.**

STRONG SOLUTION OF IODINE.

*Synonyms.*—Linimentum Iodi; Liniment of Iodine.

Iodine	...	...	...	...	...	12'00
Potassium Iodide	...	...	...	...	...	7'20
Distilled Water	...	...	...	...	...	12'00
Alcohol	...	...	...	...	...	86'40

Dissolve the potassium iodide and the iodine in the distilled water, add the alcohol, and shake.

This solution is much employed for painting the skin as a counter-irritant and absorbent in acute and chronic inflammations of various kinds (see Iodum). It penetrates the skin and to some extent irritates the underlying tissues. A small amount is absorbed.

**LIQUOR KERATINI.**

SOLUTION OF KERATIN.

Keratin	...	...	...	...	...	9'00
Strong Solution of Ammonia	...	...	...	...	...	45'50
Alcohol	...	...	...	...	...	45'50

Dissolve the keratin in the mixed liquids, and filter if necessary.

Keratin solution is used as a coating for pills which are intended to pass through the stomach and act in the small intestine; they should first be thinly coated with oil of theobroma, then twice with keratin solution, and finally varnished with sandarac. Pills which are to be coated with keratin should be massed with an oily excipient. Keratin is partially soluble in acetic and citric acids; liquids containing these organic acids should, therefore, not be taken at the same time. A much more elegant, expeditious, and trustworthy method of preparing drugs for intestinal solution is to enclose the mass in gelatin capsules, and render the latter insoluble in the gastric secretion by dipping it in solution of formaldehyde. They are then known as glutoid capsules.

**LIQUOR KRAMERIÆ CONCENTRATUS.**

CONCENTRATED SOLUTION OF KRAMERIA.

*Synonym.*—Concentrated Solution of Rhatany.

Krameria Root, in No. 40 powder	...	...	50'00
Alcohol (20 per cent.), sufficient to produce	...	...	100'00

Moisten the drug with 25 of the alcohol, pack in a closed percolator, and set aside for three days; then percolate with 100 of the alcohol, added in ten equal portions at intervals of twelve hours, and finally with more of the alcohol until the required volume is obtained.

This preparation is used as an astringent in the treatment of diarrhœa and inflamed throats. Infusum Krameriæ Concentratum is a more satisfactory preparation than the above.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR MAGNESII CARBONATIS.**

SOLUTION OF MAGNESIUM CARBONATE.

*Synonym.*—Fluid Magnesia.

Magnesium Sulphate	...	...	...	10·00
Sodium Carbonate	...	...	...	12·50
Distilled Water, sufficient to produce	...	...	...	100·00

Dissolve the magnesium sulphate in 50 of distilled water, heat the solution to boiling-point, add the sodium carbonate previously dissolved in 50 of distilled water, and boil the mixed solutions until no more carbon dioxide is evolved. Collect the precipitated magnesium carbonate on a calico filter, wash until free from sulphates, mix with 100 of distilled water, pass carbon dioxide into the liquid under pressure, and allow the mixture to remain in contact with excess of carbon dioxide, under a pressure of three atmospheres, for twenty-four hours or longer; then decant, and again pass carbon dioxide into the clear solution.

The product is a clear liquid which does not effervesce, or only slightly, when the vessel containing it is first opened. On evaporation and subsequent calcination of the residue it should yield 0·8 to 0·95 per cent. of magnesium oxide. It should be free from sulphates.

Solution of magnesium carbonate is a mild laxative and antacid suitable for children. The slight bitterness of the liquid may be masked by the addition of sugar, or an acid syrup, effervescence occurring in the latter case.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

*NOTES.*—This preparation contains about 2 per cent. of the official magnesium carbonate. It should be preserved in securely closed bottles of a convenient size.

**LIQUOR MAGNESII CITRATIS.**

SOLUTION OF MAGNESIUM CITRATE.

*Synonyms.*—Limonade Purgative; Effervescing Solution of Magnesium and Potassium Citrates.

Magnesium Carbonate...	...	...	...	4·00
Citric Acid	...	...	...	9·00
Syrup of Citric Acid	...	...	...	16·00
Potassium Bicarbonate, in crystals	...	...	...	0·75
Distilled Water, sufficient to produce	...	...	...	100·00

Dissolve the citric acid in 20 of the distilled water, and, having added the magnesium carbonate, stir until it is dissolved. Filter the solution into the syrup, contained in a strong bottle capable of holding 100, add sufficient distilled water to nearly fill the bottle, then introduce the potassium bicarbonate and immediately close the bottle with a cork, which should be secured with string or wire. Finally, shake the bottle until the potassium bicarbonate is dissolved.



This solution should be freshly prepared as required, and makes a mild laxative and antacid draught.

*Dose*.—100 to 300 mils (5 to 10 fluid ounces), or more.

*NOTE*.—This preparation is the same as *Liquor Magnesii Citratis*, U.S.P., the average dose of which is 360 mils (12 fluid ounces).

### LIQUOR METHYLAMINÆ.

#### SOLUTION OF METHYLAMINE.

Solution of methylamine,  $\text{CH}_3\text{NH}_2$ , is prepared by passing methylamine into water, and should contain from 30 to 33 per cent. of the gas.

It is a colourless liquid with a strong ammoniacal odour, and strong alkaline taste and reaction. Soluble in water and in alcohol. The aqueous solution on heating gives off methylamine in the form of gas. It should respond to the tests described under methylamine.

This solution is used for technical purposes, and is not employed in medicine.

### LIQUOR MORPHINÆ ACETATIS.

#### SOLUTION OF MORPHINE ACETATE.

Morphine Acetate	...	...	...	...	1'00
Diluted Acetic Acid	...	...	...	...	2'00
Alcohol	...	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Mix the alcohol with 25 of the water, add the acid, dissolve the morphine acetate in the mixture, and add sufficient distilled water to make up the required volume.

This preparation has the same action as other solutions of morphine, and is used for similar purposes.

*Dose*.— $\frac{1}{2}$  to 4 mils (10 to 60 minims).

### LIQUOR MORPHINÆ BIMECONATIS.

#### SOLUTION OF MORPHINE BIMECONATE.

Morphine Hydrochloride	...	...	...	...	1'00
Solution of Ammonia, a sufficient quantity.					
Meconic Acid	...	...	...	...	0'75
Alcohol	...	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the morphine hydrochloride in 20 of the distilled water, warming if necessary; then add sufficient solution of ammonia to precipitate the morphine entirely. Cool, filter, wash the precipitate with distilled water until free from chloride; then drain and mix with sufficient water to produce 75. Finally, add the alcohol and meconic acid, and dissolve.

This preparation contains about  $1\frac{1}{4}$  per cent. of morphine meconate, and is about the same strength in this respect as tincture of opium.

It is sometimes used in place of the official solutions of morphine, over which, however, it presents no advantages.

*Dose.*— $\frac{1}{2}$  to 3 mils (10 to 40 minims).

NOTE.—Liquor Morphinæ Bimeconatis was official in the British Pharmacopœia, 1885.

### LIQUOR MORPHINÆ HYDROCHLORIDI.

#### SOLUTION OF MORPHINE HYDROCHLORIDE.

*Synonyms.*—Liquor Morphinæ; Solution of Hydrochlorate of Morphine.

Morphine Hydrochloride	...	...	...	1'00
Diluted Hydrochloric Acid	...	...	...	2'00
Alcohol	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	100'00

Dissolve the morphine hydrochloride in the alcohol, previously mixed with 25 of distilled water and the acid, and add sufficient distilled water to make up the required volume.

This solution provides a convenient means of administering morphine, and is commonly used when "Liquor Morphinæ" is ordered, unless there is some obvious objection to the presence of hydrochloric acid.

*Dose.*— $\frac{1}{2}$  to 4 mils (10 to 60 minims).

### LIQUOR MORPHINÆ SULPHATIS.

#### SOLUTION OF MORPHINE SULPHATE.

Morphine Sulphate	...	...	...	1'00
Alcohol	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	100'00

Dissolve the morphine sulphate in 20 of the water; then add the alcohol, and, finally, sufficient distilled water to make up the required volume.

This preparation was formerly used in medicine, but is not now in favour.

*Dose.*— $\frac{1}{2}$  to 4 mils (10 to 60 minims).

NOTE.—Liquor Morphinæ Sulphatis was official in the British Pharmacopœia, 1885.

### LIQUOR MORPHINÆ TARTRATIS.

#### SOLUTION OF MORPHINE TARTRATE.

Morphine Tartrate	...	...	...	1'00
Alcohol	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	100'00

Dissolve the morphine tartrate in the alcohol, previously mixed with 25 of water, and add sufficient water to make up the required volume.

This preparation has the same action as other solutions of morphine, but it is rarely used.

*Dose.*— $\frac{1}{2}$  to 4 mils (10 to 60 minims).

### LIQUOR OPII SEDATIVUS.

#### SEDATIVE SOLUTION OF OPIUM.

Opium, in small pieces...	...	...	...	10'00
Calcium Hydroxide ...	...	...	...	1'50
Alcohol ...	...	...	...	20'00
Sherry ...	...	...	...	15'00
Distilled Water, a sufficient quantity.				
Alcohol (60 per cent.) sufficient to produce ...				100'00

Boil the opium and calcium hydroxide with 75 of the water for half an hour; then cool, make up to 65 with distilled water, and add the alcohol and sherry. Set aside for some time, then filter, and add sufficient alcohol (60 per cent.) to make up the required volume.

The flavour and aroma of this preparation are much improved by keeping for some time before use, a period of six months having been recommended for maturing the solution. It is prescribed by many practitioners in preference to *Extractum Opii Liquidum* and *Tinctura Opii*, for internal use, although it has the same action as those preparations.

*Dose.*—3 to 10 decimils (5 to 15 minims), for repeated administration; for a single administration 1 to 2 mils (15 to 30 minims).

### LIQUOR PANCREATICUS.

#### SOLUTION OF PANCREATIN.

Glycerin of Pancreatin ...	...	...	...	16'50
Sodium Bicarbonate ...	...	...	...	3'50
Glycerin ...	...	...	...	5'00
Alcohol ...	...	...	...	15'00
Distilled Water, sufficient to produce ...				
				100'00

Mix the glycerin of pancreatin with the sodium bicarbonate, glycerin, alcohol, and sufficient distilled water to make up the required volume. The product is a clear liquid, 1 mil of which should predigest 32 mils of milk if the mixture be kept at a temperature of 40° to 45° for fifteen minutes.

This solution is given in water half an hour before a meal, or mixed with farinaceous food (cool) to assist digestion. It is probably of little or no value, since the ferments are destroyed by the acid in the stomach.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTE.*—For the methods of preparing peptonised milk and other foods, see under *Liquor Pancreatis*, from which this preparation must be distinguished.



## LIQUOR PANCREATIS.

## PANCREATIC SOLUTION.

Fresh Pancreas of the Pig	...	...	...	25'00
Alcohol (20 per cent.)	...	...	...	100'00

Remove fat and external membrane from the pancreas, and finely divide the latter by trituration with washed sand or pumice stone; macerate with the alcohol in a closed vessel for seven days, and then filter. The product is a clear liquid, 1 mil of which should pre-digest 40 mils of milk, when mixed with 1 decigram of sodium bicarbonate and 10 mils of distilled water, and the mixture kept at a temperature of 45° for one hour; coagulation should then no longer occur on the addition of nitric acid to the milk.

Pancreatic solution is chiefly employed in the preparation of peptonised or partially digested foods. Peptonised milk is prepared by diluting fresh milk with one-fourth its volume of water, warming the mixture to 60°, and adding to each 750 mils (25 fluid ounces) of the mixture 8 mils (2 fluid drachms) of pancreatic solution and 1½ grammes (20 grains) of sodium bicarbonate, after which, the liquid is kept in a warm place. In from twenty to thirty minutes partial peptonisation will have taken place, and the product, though differing only slightly from ordinary milk in taste, will have undergone partial digestion. More complete peptonisation occurs if the action of the ferment be allowed to proceed, but the milk acquires a bitter taste. The peptonising process can be arrested at any desired stage by boiling the milk and so destroying the pancreatic enzymes. Gruel, arrow-root, and other farinaceous articles of diet may be similarly predigested. Peptonised beef tea is prepared by simmering half a pound of finely minced lean beef with a pint of water, to which a saltspoonful of sodium bicarbonate has been added, for two hours. The mixture is cooled to 60°, 2 fluid drachms of pancreatic solution added, and the whole set aside in a warm place for two hours, after which it is boiled for five minutes and strained. Such a solution contains a far larger proportion of nutritive material than ordinary beef tea. Nutritive enemata of beef tea, gruel, etc., may be rendered more easily assimilable by the addition of 2 fluid drachms of pancreatic solution just before administration. Pancreatic solution has been given internally on the supposition that it aided digestion, but the active ferments are destroyed by the acid gastric juice. If it is desired to administer trypsin or other pancreatic ferment by the mouth, it should be enclosed in a capsule which can pass through the stomach unchanged.

*Dose.*—2 to 8 mils (½ to 2 fluid drachms).

NOTE.—Liquor Pancreatis contains the digestive principles of the pancreas, and is more active when the animal from which it is obtained has been fed shortly before being killed.

**LIQUOR PAPAINI ET IRIDINI.**

## SOLUTION OF PAPAIN AND IRIDIN.

Papain	...	...	...	...	...	1'75
Iridin	...	...	...	...	...	1'75
Potassium Carbonate	...	...	...	...	...	1'50
Glycerin	...	...	...	...	...	25'00
Alcohol	...	...	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Mix the papain with the glycerin and 25 of distilled water; then apply a gentle heat on a water-bath, and stir till solution is effected. Next mix the iridin with potassium carbonate and 25 of distilled water, warm until dissolved, mix the liquid with the papain solution, add the alcohol, and make up the required volume, if necessary, by the addition of distilled water.

This preparation is used as a "digestive tonic" and "liver stimulant." The papain acts in neutral, or moderately acid or alkaline, solutions; its activity is, therefore, not destroyed in the stomach.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR PEPTICUS.**

## PEPTIC SOLUTION.

Stronger Glycerin of Pepsin	...	...	...	12'50
Diluted Hydrochloric Acid	...	...	...	2'50
Alcohol	...	...	...	10'00
Glycerin	...	...	...	2'50
Distilled Water, sufficient to produce	...	...	...	100'00

Mix the glycerin of pepsin, acid, alcohol, and glycerin with sufficient distilled water to make up the required volume. The product is a clear liquid, with a slightly acid taste.

Peptic solution is used as a digestive where there is deficiency of gastric secretion in convalescence from acute illness, but especially in all forms of wasting disease, and in cancer of the stomach. It is given in water, with or after meals, and is incompatible with alkali carbonates.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**LIQUOR PICIS CARBONIS.**

## SOLUTION OF COAL TAR.

Prepared Coal Tar	...	...	...	20'00
Quillaia Bark, in No. 20 powder	...	...	...	10'00
Alcohol, a sufficient quantity.	...	...	...	...

Add 5 of the alcohol to the powdered bark, pack in a percolator, and percolate with more of the alcohol until the resulting tincture measures 100. Digest the coal tar in this tincture at a temperature

of 49° for two days, stirring occasionally ; when cool, decant or filter the product.

Solution of coal tar possesses all the antiseptic virtues of coal tar, and is used as an antiseptic and antipruritic in lotions and ointments. It forms a milky emulsion when mixed with water. *Lotio Picis Carbonis Alkalina* contains 1 part in 200, and is employed in eczema, psoriasis, and irritable conditions of the skin. Lotions twice this strength are also employed often containing an equal quantity of *Liquor Plumbi Subacetatis*. In the form of ointment, it is employed as *Unguentum Picis Carbonis* and *Unguentum Picis Carbonis Compositum*. Solution of coal tar should not be used when there is acute inflammation of the skin.

NOTE.—*Tinctura Lithanthracis* is a solution of 30 of coal tar in 20 by weight of 95 per cent. alcohol, and 10 by weight of ether (specific gravity, 0.720).

### LIQUOR PLUMBI SUBACETATIS DILUTUS.

DILUTED SOLUTION OF LEAD SUBACETATE.

*Synonyms*.—*Liquor Plumbi* ; Goulard's Lotion ; Goulard Water.

Strong Solution of Lead Subacetate ...	...	1.25
Alcohol ... ..	...	1.25
Distilled Water, sufficient to produce	...	100.00

Boil and cool the water, add the alcohol, then mix with the solution of lead subacetate by shaking.

This solution is used as a mild astringent and sedative in sprains, bruises, and in almost all cases of acute inflammation of the skin. It is sometimes applied to the eye, but if there is ulceration, corneal opacities may be produced (see also *Lotio Plumbi Evaporans*).

NOTES.—*Liquor Plumbi Subacetatis Dilutus*, U.S.P., contains about 1 per cent. of lead subacetate, and is prepared by mixing 4 of solution of lead subacetate (25 per cent.) with sufficient distilled water to produce 100 by volume. *Lotio Plumbi* is a similar preparation, prepared without alcohol, the addition of which is unnecessary.

### LIQUOR PLUMBI SUBACETATIS FORTIS.

STRONG SOLUTION OF LEAD SUBACETATE.

*Synonyms*.—*Liquor Plumbi Fortis* ; Solution of Lead Subacetate ; Goulard's Extract.

Strong solution of lead subacetate is prepared by boiling 25 of lead acetate and 17.5 of lead oxide with 100 of distilled water for thirty minutes, constantly stirring, and occasionally adding water to replace that lost by evaporation ; when the liquid is cold, sufficient distilled water is added to make up the required volume.

The product is a clear, colourless liquid, having a sweet astringent taste and an alkaline reaction. Specific gravity, 1.275. On exposure to air it absorbs carbon dioxide, becoming turbid. With mucilage of gum acacia it forms an opaque white jelly. Complete precipitation of 1 gramme of the solution requires 17 mls of decinormal solution of sulphuric acid.



This preparation is too strong for use undiluted. Largely diluted, as *Liquor Plumbi Subacetatis Dilutus* and *Lotio Plumbi Evaporans*, it is employed as a cooling, sedative, and astringent lotion. Diluted with sixteen times its volume of water, it is a valuable application for hæmorrhoids. For irritable conditions of the skin, it is added to lotions (1 in 32 to 64), often with an equal quantity of *Liquor Picis Carbonis*. It is incompatible with chlorides, iodides, sulphates, carbonates, all astringents, mucilage of acacia, and tap water. In cases of poisoning by lead salts, the stomach is washed out, and draughts of sodium or magnesium sulphate, milk, or white of egg administered.

NOTES.—This solution can be prepared by shaking the lead compounds with cold water, and agitating at intervals for forty-eight hours. *Liquor Plumbi Subacetatis*, U.S.P., contains not less than 25 per cent. of lead subacetate, and its specific gravity is about 1.235 at 25°.

### LIQUOR POTASSII ARSENATIS ET BROMIDI.

SOLUTION OF POTASSIUM ARSENATE AND BROMIDE.

*Synonyms*.—*Liquor Arsenii Bromidi*; Clemens' Solution.

Arsenious Acid ...	...	...	...	1.00
Potassium Bicarbonate	...	...	...	1.00
Bromine, by volume	...	...	...	0.50
Distilled Water, sufficient to produce	...	...	...	100.00

Add the arsenious acid and potassium bicarbonate to 10 of distilled water and boil till dissolved; then add 70 of distilled water and the bromine, shake till dissolved, and add sufficient distilled water to make up the required volume.

The product is a pale yellowish or almost colourless liquid. It has been recommended for use in the treatment of diabetes and epilepsy. Its action is that of the  $\text{AsO}_4'''$  ion.

*Dose*.— $\frac{1}{2}$  to 3 decimils (1 to 5 minims).

NOTES.—This preparation does not contain arsenium bromide, but potassium arsenate and potassium bromide; the action of bromine on arsenious acid results in the formation of arsenic acid and hydrobromic acid.

### LIQUOR POTASSII HYDROXIDI.

SOLUTION OF POTASSIUM HYDROXIDE.

*Synonyms*.—*Liquor Potassæ*; Solution of Potash.

Solution of potassium hydroxide may be prepared by dissolving 6.19 of potassium hydroxide in sufficient distilled water to produce 100 by volume. Another method is to boil 10 of potassium carbonate with 7.5 of slaked lime and 100 of water until the liquid is free from carbonate. The product should contain 5.85 per cent. of potassium hydroxide, KOH.

It is a clear, colourless, odourless liquid, with a nauseous, acrid, and caustic taste, and a strong alkaline reaction. Specific gravity, 1.058. It should be free from lead, copper, arsenium, iron, aluminium,

calcium, magnesium, sodium, and ammonium, and from more than traces of carbonates, chlorides, and sulphates.

This solution, diluted with an equal quantity of water, is sometimes employed as a caustic, and to remove thickened epidermis. It may also be used as a cleansing agent, and to relieve itching in skin disease. Internally it is antacid, antilithic, diuretic, and when taken on an empty stomach it inhibits the secretion of gastric juice. It is given with bladder sedatives, such as henbane and buchu, and is used to emulsify copaiba balsam and castor oil, but for internal use the carbonates are almost always superior.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims), freely diluted.

NOTES. - This preparation should be kept in well-stoppered green glass bottles. Liquor Potassii Hydroxidi, U.S.P., contains about 5 per cent. by weight of potassium hydroxide, KOH, and is prepared by dissolving 6 of potassium hydroxide in 94 of distilled water; its specific gravity is about 1.046 at 25°. Alcoholic solution of potassium hydroxide is prepared by dissolving 10 of potassium hydroxide in sufficient alcohol to produce 100 by volume, and filtering.

## LIQUOR POTASSII PERMANGANATIS.

### SOLUTION OF POTASSIUM PERMANGANATE.

Potassium Permanganate	...	...	...	1.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the potassium permanganate in the distilled water.

This solution is rarely used internally, on account of its nauseous taste. As a lotion, vaginal injection or gargle, 1 part is diluted with 50 parts of water. It is incompatible with all organic substances—*e.g.*, glycerin, alcohol, sugar, and vegetable infusions.

*Dose.*—8 to 15 mils (2 to 4 fluid drachms).

NOTE.—Solution of potassium permanganate is a valuable antidote in opium poisoning, in doses of 8 mils (2 fluid drachms), or more.

## LIQUOR QUASSIÆ CONCENTRATUS.

### CONCENTRATED SOLUTION OF QUASSIA.

Quassia Wood, in No. 40 powder	...	...	10.00
Alcohol (20 per cent.), sufficient to produce	...	...	100.00

Moisten the drug with 10 of the alcohol, transfer to a percolator, set aside for three days, then percolate with 100 of the alcohol, which should be added in ten equal portions, at intervals of twelve hours; finally percolate with sufficient of the alcohol to produce the required volume.

This preparation is official, but it is less satisfactory than Infusum Quassiæ Concentratum.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR QUININÆ ET STRYCHNINÆ.**

SOLUTION OF QUININE AND STRYCHNINE.

*Synonym.*—Liquor pro Syrupo Eastoni.

Quinine Sulphate	...	...	...	...	7.78
Strychnine	...	...	...	...	0.305
Concentrated Phosphoric Acid	...	...	...	...	3.34
Distilled water, sufficient to produce	...	...	...	...	100.00

Dissolve the strychnine in the phosphoric acid by the aid of gentle heat, then dissolve the quinine sulphate in the solution, and add the distilled water.

This preparation is used for the extemporaneous production of Syrupus Ferri Phosphatis cum Quinina et Strychnina,  $1\frac{1}{2}$  volumes of the solution being mixed with 1 of solution of ferrous phosphate and sufficient syrup to produce 8 by volume.

NOTE.—This solution contains 34 grains of quinine sulphate,  $1\frac{1}{2}$  grains of strychnine, and 16 minims of concentrated phosphoric acid in 1 fluid ounce.

**LIQUOR RHEI CONCENTRATUS.**

CONCENTRATED SOLUTION OF RHUBARB.

Rhubarb Root, in No. 5 powder	...	...	50.00
Alcohol (20 per cent.) sufficient to produce	...	...	100.00

Moisten the drug with 25 of the alcohol, transfer to a percolator, set aside for three days, then percolate with 100 of the alcohol, which should be added in ten equal portions, at intervals of twelve hours; finally percolate with sufficient of the alcohol to produce the required volume.

This preparation is official, but a more satisfactory preparation is Infusum Rhei Concentratum.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR SALOLIS COMPOSITUS.**

COMPOUND SOLUTION OF SALOL.

*Synonym.*—Salol Mouth Wash.

Salol	...	...	...	...	...	2.50
Thymol	...	...	...	...	...	0.25
Spirit of Anise	...	...	...	...	...	1.00
Oil of Peppermint	...	...	...	...	...	0.50
Elixir of Gluside	...	...	...	...	...	2.50
Alcohol, sufficient to produce	...	...	...	...	...	100.00

Dissolve the salol and the oil of peppermint in 50 of alcohol, add the spirit of anise and the elixir of gluside, make up the required volume by the addition of alcohol, and filter.

This solution forms a refreshing antiseptic mouth wash if a few drops be added to a wineglassful of water.



**LIQUOR SANTALI COMPOSITUS.**

## COMPOUND SOLUTION OF SANDAL WOOD.

Oil of Sandal Wood	...	...	...	...	5'00
Spirit of Cinnamon	...	...	...	...	2'50
Tincture of Buchu	...	...	...	...	17'00
Tincture of Cubebs	...	...	...	...	15'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the oil of sandal wood in the mixed liquids, and filter if necessary.

This solution is a stimulating disinfectant to the mucous membranes of the bladder and urethra, and is employed chiefly in subacute and chronic gonorrhœa. Large doses tend to cause renal irritation.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**LIQUOR SARSÆ COMPOSITUS CONCENTRATUS.**

## CONCENTRATED COMPOUND SOLUTION OF SARSAPARILLA.

*Synonyms.*—Decoctum Sarsæ Compositus Concentratus; Concentrated Compound Decoction of Sarsaparilla.

Sarsaparilla, cut transversely, and bruised	...	...	...	...	100'00
Sassafras Root, in shavings	...	...	...	...	10'00
Guaiacum Wood, in shavings	...	...	...	...	10'00
Dried Liquorice Root, bruised	...	...	...	...	10'00
Mezereon Bark, cut small	...	...	...	...	5'00
Alcohol	...	...	...	...	22'50

Distilled Water, a sufficient quantity.

Add the sarsaparilla to 500 of distilled water, at 71°, and infuse for one hour at that temperature. Repeat the infusion twice with similar quantities of water, exhaust the other solid ingredients by boiling with distilled water, mix the three infusions with the decoction, and rapidly reduce the whole by evaporation, until the product measures 80; then add the alcohol, set aside for fourteen days, and filter. The product should measure 100.

This solution is approximately eight times the strength of Decoctum Sarsæ Compositum. It is used largely as a vehicle for potassium iodide.

*Dose.*—8 to 30 mils (2 to 8 fluid drachms).

**LIQUOR SENEGÆ CONCENTRATUS.**

## CONCENTRATED SOLUTION OF SENEGA.

Senega Root, in No. 20 powder	...	...	...	...	50'00
Alcohol (20 per cent.)	...	...	...	...	84'00
Alcohol (45 per cent.)	...	...	...	...	42'00

Mix the alcohols, moisten the drug with 26 of the mixture and pack in a percolator; after an interval of three days, percolate with 100 of the mixture, which should be added in ten equal portions, at intervals of twelve hours, and continue the percolation, if necessary

with more of the alcohols, mixed in the same proportions, in order to produce 100 by volume.

This preparation may, with advantage, be replaced by Infusum Senegæ Concentratum.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### LIQUOR SENNÆ CONCENTRATUS.

#### CONCENTRATED SOLUTION OF SENNA.

Senna, in No. 5 powder.	...	...	...	100·00
Tincture of Ginger	...	...	...	12·50
Alcohol	...	...	...	10·00
Distilled Water, sufficient to produce	...	...	...	100·00

Slightly moisten one-third of the senna with distilled water, transfer to a percolator, set aside for twenty-four hours, then percolate with distilled water until the product measures 25. Repeat the process with an equal weight of the senna, using the percolate from the first portion for percolation together with an additional 25 of liquid obtained by passing more water through the first portion. Again, repeat the operation with the remainder of the senna, using the percolates from the second portion as extracting media, and continuing successive percolation through the three portions of senna until the product from the third percolator measures 80; then heat the liquid to about 82° for five minutes, cool, add the previously mixed alcohol and tincture of ginger, set aside for seven days, and filter. The finished preparation should measure 100.

This preparation should be replaced by Infusum Sennæ Concentratum, which is a more satisfactory product.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### LIQUOR SERIPARUS.

#### SOLUTION OF RENNET.

*Synonyms.*—Essence of Rennet; Curdling Fluid.

Rennet, salted and cut small	...	...	...	15·00
Alcohol	...	...	...	25·00
Sherry	...	...	...	10·00
Kaolin	...	...	...	2·50
Distilled Water, sufficient to produce	...	...	...	100·00

Macerate the rennet with the alcohol and 65 of distilled water, for four days; then add the sherry, set aside for three days, and strain. Next add the kaolin, shake, and set aside for seven days. Finally, decant the clear solution, filter the remainder, and add sufficient distilled water to make up the required volume.

Essence of rennet is used to coagulate milk in the preparation of junket, rennet, whey, etc., 4 to 8 mls (1 to 2 fluid drachms, being sufficient to coagulate 600 mls (20 fluid ounces) of milk, after

warming it to a temperature of  $37^{\circ}$ . Milk which has been boiled is not coagulated by rennet, but may be rendered coagulable by the addition of a few drops of lactic acid.

### LIQUOR SERPENTARIÆ CONCENTRATUS.

CONCENTRATED SOLUTION OF SERPENTARY.

Serpentary Rhizome, in No. 40 powder	...	50.00
Alcohol (20 per cent.), sufficient to produce	...	100.00

Proceed in the same way as in preparing Liquor Chiratae Concentratus.

This preparation should be replaced by Infusum Serpentariæ Concentratum, which is a better product.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

### LIQUOR SODÆ CHLORINATÆ.

SOLUTION OF CHLORINATED SODA.

*Synonym.*—Bleaching Solution.

Chlorinated Lime	...	...	...	...	10.00
Sodium Carbonate	...	...	...	...	15.00
Distilled Water	...	...	...	...	100.00

Triturate the chlorinated lime with 75 of the water, add the sodium carbonate, previously dissolved in 25 of distilled water, and filter. The product is a colourless alkaline liquid, having an astringent, disagreeable taste, and faint odour of chlorine. Specific gravity, 1.054. It decolourises solution of indigo sulphate and vegetable colours generally. It should contain  $2\frac{1}{2}$  per cent. of available chlorine, and be almost free from calcium and carbonates.

This solution has been recommended for internal use as an antiseptic in infective conditions of the alimentary canal, but its value is unproved. Externally it is used, diluted with 10 to 15 parts of water, as a lotion for ulcers and foul wounds, and as a gargle or spray solution in tonsillitis, scarlet fever, and diphtheria. It is sometimes employed as a bleaching agent.

*Dose.*—6 to 12 decimils (10 to 20 minims).

NOTES.—Solution of chlorinated soda should be kept in well-stoppered bottles, and stored in a cool, dark place. Labarraque's Solution is a solution of chlorinated soda, about one-fourth the strength of the official preparation. Eau de Javelle is a similar solution of chlorinated potash. Liquor Sodæ Chlorinatæ, U.S.P., is prepared with 9 per cent. by weight of chlorinated lime and 6.5 per cent. of monohydrated sodium carbonate; it contains at least 2.4 per cent. by weight of available chlorine, and its specific gravity is about 1.050 at  $25^{\circ}$ .

### LIQUOR SODII ARSENATIS.

SOLUTION OF SODIUM ARSENATE.

Sodium Arsenate, anhydrous	...	...	...	1.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the freshly exsiccated sodium arsenate in the distilled water. The product is a clear, colourless, and odourless liquid.



This solution is used for the same purposes as *Liquor Arsenicalis*, but it is somewhat less active.

*Dose*.—1 to 5 decimils (2 to 8 minims).

*NOTES*.—Pearson's solution of sodium arsenate is about one-tenth the strength of the official preparation. *Liquor Sodii Arsenatis*, U.S.P., contains 1 per cent. by weight of exsiccated sodium arsenate, and the average dose is 2 decimils (3 minims). Zambelletti's Fluid contains about 0.5 per cent. of sodium arsenate, and a similar solution (*Injectio Sodii Arsenatis et Ferri*) may be prepared by dissolving that proportion of the arsenate in cherry-laurel water, with the addition of 4 per cent. of iron and ammonium citrate. Dose, 3 to 6 decimils (5 to 10 minims), hypodermically.

## LIQUOR SODII CARBOLATIS.

SOLUTION OF SODIUM CARBOLATE.

*Synonym*.—Solution of Sodium Phenate.

Carbolic Acid	...	...	...	...	8.00
Sodium Hydroxide	...	...	...	...	4.00
Glycerin of Cochineal	...	...	...	...	1.00
Distilled Water, sufficient to produce...	...	...	...	...	100.00

Dissolve the carbolic acid and sodium hydroxide in the distilled water, and add the solution of carmine. The product is a clear, reddish liquid, with a faint odour of carbolic acid.

This solution is used as an antiseptic mouth wash after tooth extraction and in dental caries, 4 mils (1 fluid drachm) being added to a wineglassful of water.

## LIQUOR SODII ETHYLATIS.

SOLUTION OF SODIUM ETHYLATE.

Solution of sodium ethylate is prepared by cautiously dissolving 5 of clean, bright sodium in 100 by volume of absolute alcohol, the flask in which solution is effected being kept cool by means of cold water.

It is a colourless, syrupy liquid, containing 18 per cent. of sodium ethylate,  $\text{NaC}_2\text{H}_5\text{O}$ . Specific gravity, 0.867. The solution becomes brown on keeping, and is decomposed by contact with water.

Solution of sodium ethylate is applied as a caustic to warts, *nævi*, lupus, and vascular growths. Moist surfaces should be dried before the caustic is applied by means of a glass rod.

*NOTE*.—This solution should be freshly prepared as required.

## LIQUOR SODII HYDROXIDI.

SOLUTION OF SODIUM HYDROXIDE.

*Synonyms*.—*Liquor Sodæ*; Solution of Soda.

Sodium Hydroxide (90 per cent.)	...	...	...	...	5.60
Distilled Water	...	...	...	...	94.40

Dissolve the sodium hydroxide in the water. If the caustic soda used be of any other strength than 90 per cent., the quantity required may be determined by dividing 504 by the percentage of absolute sodium hydroxide it contains.

The solution is a clear, colourless, odourless liquid, with a nauseous, acrid and caustic taste, and a strongly alkaline reaction. Specific gravity about 1.059 (about 1.056 at 25°). The solution should contain about 5 per cent. of pure sodium hydroxide, and be free from the impurities mentioned under *Liquor Potassii Hydroxidi*.

Solution of sodium hydroxide is used chiefly in making various preparations. It must be distinguished from the 20 per cent. w/v solution used in official tests (see Notes).

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims), freely diluted.

*NOTES.*—This preparation should be kept in well-stoppered green glass bottles. It may also be made by boiling 17 of sodium carbonate and 5 of lime (previously slaked) with distilled water for ten minutes, then making the product up to 100 by weight with distilled water. Test solution of sodium hydroxide is prepared by dissolving 20 of purified sodium hydroxide in sufficient distilled water to produce 100 by volume.

### LIQUOR SODII HYPOBROMITIS.

#### SOLUTION OF SODIUM HYPOBROMITE.

Sodium Hydroxide	...	...	...	...	26.75
Bromine	...	...	...	...	6.50
Distilled Water, sufficient to produce	...	...	...	...	100.00

Dissolve the sodium hydroxide in the distilled water, cool the solution, and gradually add the bromine.

This solution is used in the determination of the amount of urea in urine. On adding solution of sodium hypobromite, nitrogen is evolved from the urea, and is measured in a nitrometer or suitable apparatus. In place of bromine an equivalent quantity of *Liquor Bromi Fortis* may be employed, or bromine in sealed glass capsules can be purchased.

### LIQUOR SODII PHOSPHATIS COMPOSITUS.

#### COMPOUND SOLUTION OF SODIUM PHOSPHATE.

Sodium Phosphate	...	...	...	...	100.00
Sodium Nitrate	...	...	...	...	4.00
Citric Acid	...	...	...	...	13.00
Distilled Water, sufficient to produce	...	...	...	...	100.00

Triturate the salts with the acid until liquefied, add sufficient distilled water to produce the required volume, and filter.

This preparation is a palatable solution of sodium phosphate, which does not readily crystallise, but it does not possess any other advantage over an ordinary aqueous solution of the salt.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

*NOTES.*—This preparation corresponds to *Liquor Sodii Phosphatis Compositus*, U.S.P. It should be kept in well-stoppered bottles, and stored in a moderately warm place.

**LIQUOR STRYCHNINÆ HYDROCHLORIDI.**

## SOLUTION OF STRYCHNINE HYDROCHLORIDE.

*Synonym.*—Solution of Hydrochlorate of Strychnine.

Strychnine Hydrochloride	...	...	...	1'00
Alcohol	...	...	...	25'00
Distilled Water, sufficient to produce	...	...	...	100'00

Add the strychnine hydrochloride to the alcohol mixed with three times its volume of distilled water, dissolve, and make up the required volume by the addition of distilled water. The product is a clear, colourless, bitter liquid.

This is a convenient solution for administration by the mouth; it is sometimes employed hypodermically, but for this purpose a freshly prepared solution without alcohol is preferable.

*Dose.*—1 to 5 decimils (2 to 8 minims) or more.

**LIQUOR THEOBROMATIS ÆTHEREUS.**

## ETHEREAL SOLUTION OF THEOBROMA.

Oil of Theobroma	...	...	...	16'50
Ether, sufficient to produce	...	...	...	100'00

Dissolve the oil of theobroma in the ether, and add an equal volume of alcohol when required for use.

Ethereal emulsion of theobroma is used as a tablet-excipient for substances which form masses of a pill-like nature with water, such as aloes and extract of cascara. Two modifications of this formula are recommended for use on occasion. (1) The use of a weaker alcohol when the granulation produced with the stronger alcohol is imperfect, in which case the ethereal solution of theobroma and alcohol should be added separately, as in the case of *Tabellæ Opii*. (2) Reduction of the proportion of alcohol when an equal volume would produce a sticky mass, as in the case of *Tabellæ Cascaræ Sagradæ*. In granulating with ethereal emulsion of theobroma the excipient should be added all at once to the substance or mixture contained in a mortar, trituration accomplished as quickly as possible, the mass passed through a No. 20 sieve, and set aside to dry.

**LIQUOR THYMOLIS COMPOSITUS.**

## COMPOUND SOLUTION OF THYMOL.

*Synonyms.*—Liquor Antisepticus; Antiseptic Solution.

Boric Acid	...	...	...	...	2'00
Benzoic Acid...	...	...	...	...	0'10
Thymol	...	...	...	...	0'10
Eucalyptol	...	...	...	...	0'025
Oil of Peppermint	...	...	...	...	0'05
Oil of Gaultheria	...	...	...	...	0'025
Oil of Thyme	...	...	...	...	0'01
Alcohol	...	...	...	...	26'50
Purified Talc	...	...	...	...	2'00
Distilled Water, sufficient to produce...	...	...	...	...	100'00



Dissolve the boric acid in 70 of the water, and add the benzoic acid previously dissolved in 16 of the alcohol; then dissolve the thymol in the eucalyptol and volatile oils, thoroughly incorporate the talc, and add the solution of acids, with constant trituration. Allow the mixture to stand, with occasional agitation, for forty-eight hours, then filter, add the remainder of the alcohol to the filtrate, and make up the required volume with distilled water.

Compound solution of thymol, diluted with 3 or 4 parts of water, is used as an antiseptic mouth wash and gargle, to sniff up the nose in catarrh, and as a wash for wounds. It is taken internally as a mild antiseptic in flatulence, diarrhœa, etc.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTES.*—This preparation corresponds to *Liquor Antisepticus*, U.S.P., which contains 25 of 95 per cent. alcohol in 100 by volume.

## LIQUOR THYROIDEI.

### THYROID SOLUTION.

Thyroid solution is prepared from the fresh and healthy thyroid glands of sheep, removed immediately after killing. The glands are freed from external fat and connective tissue, and cut across, any that contain cysts, or are hypertrophied, or are otherwise abnormal, being rejected. For each entire gland (consisting of two lobes) take 2 mls of glycerin and 2 mls of 0·5 per cent. solution of phenol in water; stir well together, place the mixture in a flask; plug the neck with cotton wool, and set aside for twenty-four hours; then strain through linen, pressing strongly, and to the liquid thus obtained add sufficient 0·5 per cent. solution of phenol, so that 6 mls (100 minims) of the solution shall represent one gland.

The solution is a turbid pinkish liquid, which should be entirely free from any putrescent odour, but it does not keep well when prepared as described (see *Notes*).

Thyroid solution is used to augment the supply of the internal secretion of the thyroid gland where this is naturally deficient; it is therefore largely employed in myxœdema and cretinism. The solution has also been used with success in some goîtres, psoriasis, and insanity, whilst its marked action in augmenting proteid breakdown has given it a reputation in the treatment of obesity. It is usually prescribed undiluted; it may, however, be reduced in strength with a mixture of glycerin, 1 part, and chloroform water, 2 parts.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTES.*—This preparation must be recently prepared, and should be kept in well-stoppered, sterilised bottles. Its keeping properties are improved by making it in a similar way to *Extractum Thyroidei Liquidum*, which is about one-third stronger and keeps much better.

**LIQUOR TINOSPORÆ CONCENTRATUS.**

CONCENTRATED SOLUTION OF TINOSPORA.

Tinospora, in No. 5 powder	...	...	...	50·00
Alcohol	...	...	...	22·50
Distilled Water, sufficient to produce	...	...	...	100·00

Mix the drug with 50 of the water, macerate for twenty-four hours, press strongly, repeat the operation, mix the expressed liquids, and heat for five minutes at a temperature of 82°; when the liquid is cold add the alcohol, set aside to clear, decant or filter, and add sufficient distilled water to make up the required volume.

Concentrated solution of tinospora is official in India and the Eastern Colonies, where it is used as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR TODDALIÆ CONCENTRATUS.**

CONCENTRATED SOLUTION OF TODDALIA.

Toddalia, in No. 40 powder	...	...	...	50·00
Alcohol (20 per cent.), sufficient to produce	...	...	...	100·00

Proceed in the same way as in preparing Liquor Cuspariæ Concentratus.

Concentrated solution of toddalia is official in India and the Eastern Colonies, where it is used as an aromatic bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**LIQUOR TOLUTANUS.**

SOLUTION OF BALSAM OF TOLU.

Balsam of Tolu	...	...	...	...	10·00
Alcohol	...	...	...	...	30·00
Distilled Water	...	...	...	...	65·00

Dissolve the balsam of tolu in the alcohol, and add the solution to the distilled water at a temperature of 70°; shake vigorously, set aside for twenty-four hours, and filter bright.

This solution is used to prepare a syrup of tolu which is more aromatic than the official Syrupus Tolutanus, one volume of the solution being diluted with seven volumes of syrup.

*NOTE.*—This preparation is liable to deposit crystals in cold weather, but they will dissolve in the liquid if the bottle containing it be removed to a warm place.

**LIQUOR TRINITRINI.**

SOLUTION OF TRINITRIN.

*Synonyms.*—Solution of Nitroglycerin; Spiritus Glycerylis Nitratis; Spirit of Glyceryl Trinitrate; Solution or Spirit of Glonoin.

Nitroglycerin	...	...	...	...	1·00
Alcohol, sufficient to produce	...	...	...	...	100·00

Dissolve the nitroglycerin in the alcohol. The product is a transparent, colourless, neutral liquid. Specific gravity, 0·840. A mixture

of 10 mils with an equal volume of water remains clear when cooled to 15.5°, but the further admixture of 1 mil of water causes opacity, indicating the presence of the full amount, 1 per cent., of trinitrin.

Solution of trinitrin is employed to reduce arterial tension in arterial degeneration and chronic Bright's disease. It is also given to relieve spasmodic asthma and the difficult breathing of acute bronchitis. Its action resembles that of amyl nitrite, but is less rapidly produced and is more prolonged. It is also used to dilate the coronary vessels in angina pectoris. The dose may be given on sugar or in mixture form with weak alcohol or a tincture.

*Dose.*—3 to 12 centimils ( $\frac{1}{2}$  to 2 minims), or more.

NOTES.—In addition to this solution, 5 and 10 per cent. solutions of nitroglycerin can be obtained in commerce. Spiritus Glycerylis Nitratis, U.S.P., contains 1 per cent. by weight of nitroglycerin, and its specific gravity is 0.814 to 0.820 at 25°.

## LIQUOR ZINCI CHLORIDI.

### SOLUTION OF ZINC CHLORIDE.

Solution of zinc chloride is prepared by adding 40 of granulated zinc to 110 of hydrochloric acid, previously mixed with 50 of distilled water, heating gently in a porcelain dish until gas ceases to be evolved, then boiling for thirty minutes, adding more water to replace that lost by evaporation, and cooling, filtering, and evaporating to 100 by volume. If lead or iron be found in the solution before evaporation, it must be removed by adding solution of chlorine, and precipitating with zinc carbonate.

The solution is a colourless, odourless liquid with a sweetish, astringent taste. Miscible with water and alcohol. Specific gravity, 1.530. It should be free from lead, copper, cadmium, arsenium, iron, aluminium, calcium, magnesium, and sulphates. Four minims of the solution contain approximately 3 grains of zinc chloride. On dilution of the solution with much water, some insoluble basic oxychloride is formed by dissociation.

Solution of zinc chloride is a powerful astringent, antiseptic, and disinfectant. It may, with advantage, be used for the preparation of astringent lotions, though solid zinc chloride, which often contains a large proportion of insoluble oxychloride, is commonly employed for that purpose. The solution was formerly much used as a general disinfectant of ejecta, etc., diluted with 50 to 100 parts of water. Its disinfectant properties are not destroyed by contact with organic matter. Diluted with about ten times its volume of water it may be employed to swab out the uterus after curetting. Solution of zinc chloride is extremely poisonous. Suitable antidotes are sodium and potassium carbonate solutions in quantity, milk, and white of egg.

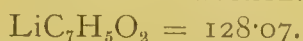
NOTES.—Liquor Zinci Chloridi, U.S.P., contains about 50 per cent. by weight of zinc chloride, and its specific gravity is about 1.548 at 25°; it is prepared by dissolving 24 of zinc in 84 of hydrochloric acid, treating the solution with 1.2 of nitric



acid (68 per cent.), dissolving the product in water, shaking the solution with 1·2 of precipitated zinc carbonate, and allowing it to clear by subsidence.

### LITHII BENZOAS.

LITHIUM BENZOATE.



Lithium benzoate,  $\text{LiC}_7\text{H}_5\text{O}_2$ , may be prepared by stirring lithium carbonate into distilled water, and adding a sufficiency of benzoic acid to the warmed liquid. The resulting solution may be filtered, evaporated to a low bulk, allowed to crystallise, and the crystals dried at the ordinary temperature, or the solution may be evaporated, and the residue dried at  $30^\circ$  to  $35^\circ$ . The product should contain about 98·5 per cent. of pure lithium benzoate.

It occurs as a light, white powder or in small, shining, crystalline scales, odourless or with a slight benzoin-like odour, and having a sweetish saline taste. It is slightly unctuous to the touch. Soluble in cold water (about 1 in 3), in boiling water (about 1 in 2), in cold alcohol (1 in 15), in boiling alcohol (1 in 10). Aqueous solutions are neutral or faintly acid to litmus. The presence of sodium benzoate increases the solubility in water, and lessens that in alcohol. An aqueous solution gives with solution of ferric chloride a yellowish-brown precipitate. On heating, the salt fuses, and at a higher temperature it carbonises, giving off inflammable vapours of a benzoin-like odour; on complete ignition it leaves a white residue of lithium carbonate, giving an alkaline reaction. A 10 per cent. aqueous solution gives on the addition of excess of hydrochloric acid a white crystalline magma, which dissolves on addition of hot water or on shaking with ether; or if it be filtered, the filtrate evaporated to dryness, and the residue ignited, 1 of the residue should be soluble in 5 of absolute alcohol, and on adding an equal volume of ether to the solution no turbidity should be produced (limit of other alkalies). If a weighed quantity of the freshly dried salt be ignited, and the residue dissolved in water, titration with volumetric solution of sulphuric acid should indicate 98 per cent. of lithium benzoate. It should be free from lead, arsenium, iron, calcium, aluminium, and potassium, and should not contain more than traces of sulphates or chlorides.

Lithium benzoate resembles in its action the benzoates of sodium and potassium. It is antiseptic and diuretic, disinfecting the urinary tract without giving rise to much irritation. The acid radical is excreted as hippuric acid in the urine, and this salt of lithium does not therefore render the urine less acid as does the citrate. It is employed in cystitis and gonorrhœa, and exercises a disinfectant action in the alimentary canal. It has no action in gout or rheumatism, although formerly credited with limiting uric acid formation. Lithium benzoate is commonly given in mixture form, or enclosed in a cachet to be swallowed with a large draught of water. It is incompatible with alkali carbonates and with mineral acids.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

**LITHII BROMIDUM.**

LITHIUM BROMIDE.

 $\text{LiBr} = 86.99.$ 

Lithium bromide,  $\text{LiBr}$ , may be prepared by neutralising a hot solution of hydrobromic acid with lithium carbonate. The solution obtained, which must be faintly acid after all carbon dioxide is driven off, is filtered, evaporated, and the residue dried at  $120^{\circ}$ . It may be obtained in crystals by evaporating its syrupy solution over concentrated sulphuric acid. The freshly dried salt should contain about 97 per cent. of lithium bromide.

It usually occurs as a white crystalline powder, more or less granular, very deliquescent, odourless, and having a somewhat sharp and bitter taste. Soluble in cold water (5 in 3), in boiling water (10 in 3), soluble also in alcohol and in alcohol-ether. The aqueous solution is neutral. Lithium bromide should be free from yellow colouration (absence of free bromine). On adding a little chlorine water, and shaking with chloroform, the latter will dissolve the liberated bromine, and become brownish-yellow, but without any violet tint (absence of iodine). On heating, the salt fuses, and slowly volatilises as the temperature is raised. The salt should form a clear solution when dissolved in 5 parts of alcohol, and the solution should not be rendered turbid by the addition of an equal volume of ether (limit of other alkalis). Lithium bromide should be free from lead, arsenium, copper, iron, sulphates, and iodides, and should not contain more than faint traces of potassium or chlorides.

Lithium bromide has similar properties to potassium bromide, but it is liable to cause digestive disturbances, and, on account of the larger proportion of bromine present, is a more powerful hypnotic. It is best given in solution in mixture form, flavoured with aromatic syrup. It is incompatible with alkali carbonates.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

**LITHII CARBONAS.**

LITHIUM CARBONATE.

 $\text{Li}_2\text{CO}_3 = 74.06.$ 

Lithium carbonate,  $\text{Li}_2\text{CO}_3$ , may be obtained by various processes from lepidolite and other mineral ores containing lithium. It should contain at least 96 per cent. of pure lithium carbonate, but does not often attain the official standard of 98.5 per cent.

It occurs as a white amorphous powder, or in minute crystalline grains, odourless, and having a weak alkaline taste. Soluble in cold water (1 in 70); in boiling water (1 in 140); more soluble in water containing carbon dioxide; insoluble in alcohol; soluble in diluted acids with effervescence. Its aqueous solution is alkaline to litmus paper. On heating to dull redness it melts to a transparent liquid,

losing a portion of its carbon dioxide, and becoming partially converted into oxide. If 0.5 gramme be dissolved in 2 mls hydrochloric acid and the clear solution evaporated to dryness, the dry residue should dissolve completely in 3 mls absolute alcohol, and should not be rendered turbid by the addition of an equal volume of ether (limit of other alkalies). The purity of lithium carbonate may be determined by treating with sulphuric acid and weighing as sulphate. It should be free from lead, arsenium, copper, iron, aluminium, zinc, magnesium, sodium, potassium, ammonium, and chlorides, and should not contain more than traces of calcium or sulphates.

Lithium carbonate resembles in its action the carbonates of sodium and potassium. It is diuretic, and is employed to increase the alkalinity of the blood and prevent the deposition of insoluble urates, or remove deposits already formed. It is, however, extremely doubtful whether, in the concentration obtained, lithium salts have much action in this latter direction. The urates of lithium are more soluble than the corresponding salts of sodium or potassium, and it is upon this fact that the use of lithium salts in gout and rheumatism is founded. Lithium carbonate is given internally in the form of effervescing lithia water, or in dilute solution in distilled water, copious draughts being taken preferably on an empty stomach. A saturated solution of lithium carbonate is applied locally to inflamed gouty joints; a compress being kept wet with the alkaline liquid.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (2 to 5 grains).

## LITHII CARBONAS EFFERVESCENS.

### EFFERVESCENT LITHIUM CARBONATE.

Lithium Carbonate	...	...	...	...	3.50
Sodium Bicarbonate, in powder	...	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	...	24.00
Citric Acid, in powder	...	...	...	...	18.00
Refined Sugar, in powder	...	...	...	...	18.50

Mix, and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100.

Effervescent lithium carbonate is taken with large draughts of water to render the urine less acid and assist the excretion of uric acid.

*Dose.*—2 to 8 grammes (30 to 120 grains).

NOTE.—*Lithii Salicylas Effervescens* may be prepared in the same way and of the same strength as the above. Dose, 2 to 8 grammes (30 to 120 grains).

## LITHII CHLORIDUM.

### LITHIUM CHLORIDE.

$\text{LiCl} = 42.48.$

Lithium chloride,  $\text{LiCl}$ , may be prepared by neutralising hydrochloric acid with lithium carbonate, or by decomposing an aqueous



solution of lithium sulphate with barium chloride. If evaporated to dryness the anhydrous salt is produced; but if evaporated slowly over concentrated sulphuric acid the crystalline salt may be obtained.

It occurs in white, octahedral crystals, or more frequently in crystalline powder or masses, very deliquescent, much more so than calcium chloride, and has a taste like sodium chloride. It combines with water of crystallisation to form  $\text{LiCl}, \text{H}_2\text{O}$  and  $\text{LiCl}, 2\text{H}_2\text{O}$ . It also forms a crystalline compound with alcohol. Readily soluble in water, alcohol, and ether-alcohol. Evaporation of an aqueous solution is accompanied by slight decomposition, traces of hydrochloric acid being formed, and the solution becoming alkaline. At a red heat it fuses to a clear liquid, giving off some chlorine and becoming alkaline; at a higher temperature it may be volatilised. Alcohol dissolves lithium chloride from an admixture with sodium and potassium chlorides. It should be free from the impurities mentioned under *Lithii Carbonas*.

Lithium chloride has the typical salt action of the chlorides of the alkali metals. It is diuretic and is occasionally employed in very dilute solution in gout and rheumatism. The Li ion differs from that of K and Na in that it is more irritant to the gastro-intestinal canal.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

## LITHII CITRAS.

### LITHIUM CITRATE.



Lithium citrate,  $\text{Li}_3\text{C}_6\text{H}_5\text{O}_7, 4\text{H}_2\text{O}$ , may be prepared by neutralising a solution of citric acid with lithium carbonate, filtering and crystallising the solution. It should contain about 98.5 per cent. of pure lithium citrate.

It occurs in white crystals, somewhat deliquescent, odourless, and having a cooling, slightly saline taste. Soluble in water (1 in 2); almost insoluble in alcohol or ether. The aqueous solution is neutral to litmus paper. It loses three-fourths of its water of crystallisation at  $100^\circ$ , but requires a temperature of  $140^\circ$  to render it anhydrous. Heated to redness it chars, giving off inflammable vapours and finally leaving a white residue of lithium carbonate. If too much heat is used during incineration some of the carbonate may be converted to oxide. In any case the residue should be well moistened with solution of ammonium carbonate and again carefully ignited. Lithium citrate should be free from the impurities mentioned under *Lithii Carbonas*.

Lithium citrate resembles in its action the citrates of sodium and potassium and is excreted in the urine as lithium carbonate. It increases the alkalinity of the blood and renders the urine less acid. For the reasons stated under *Lithii Carbonas*, it is largely employed in gout and rheumatism, being often preferred to the carbonate on account of its greater solubility in water. It is given

in solution with large draughts of water, in tablets, or as *Lithii Citras Effervescens*.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

*NOTE*.—Powdered lithium citrate is obtained by partly drying the crystals and powdering.

### LITHII CITRAS EFFERVESCENS.

#### EFFERVESCENT LITHIUM CITRATE.

Lithium Citrate...	...	...	...	...	5'00
Sodium Bicarbonate, in powder	...	...	...	...	58'00
Tartaric Acid, in powder	...	...	...	...	31'00
Citric Acid, in powder	...	...	...	...	21'00

Thoroughly mix the powders by trituration, adding to the lithium citrate first the citric, then the tartaric acid, and finally the sodium bicarbonate; granulate and proceed as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100.

Effervescing lithium citrate is given with large draughts of water as a diuretic to aid excretion of uric acid.

*Dose*.—4 to 8 grammes (60 to 120 grains).

*NOTE*.—*Lithii Citras Effervescens*, U.S.P., is prepared with 5 of lithium citrate, 57 of dried sodium bicarbonate, 30 of dried tartaric acid, and 19½ of citric acid.

### LITHII CITRAS LAXATIVUS EFFERVESCENS.

#### EFFERVESCENT LAXATIVE CITRATE OF LITHIUM.

Lithium Citrate	...	...	...	...	10'00
Sodium Phosphate, dried	...	...	...	...	30'00
Sodium Bicarbonate	...	...	...	...	44'00
Tartaric Acid	...	...	...	...	15'00
Citric Acid	...	...	...	...	17'50

Mix well and granulate as directed in the case of *Caffeinæ Citras Effervescens*.

This preparation is an excellent saline diuretic, purgative, and anti-lithic for use in gout.

*Dose*.—4 to 8 grammes (60 to 120 grains).

### LITHII FORMAS.

#### LITHIUM FORMATE.



Lithium formate,  $\text{LiHCOO}, \text{H}_2\text{O}$ , may be prepared by neutralising an aqueous solution of formic acid with lithium carbonate or oxide and evaporating the solution.

It occurs in the form of rhombic prisms, or as a white, crystalline powder. Readily soluble in water. Heated to 100° the salt loses its water of crystallisation. The aqueous solution becomes dark red in colour on treatment with ferric salts. In aqueous solution it reduces silver and mercury salts on boiling. When heated with

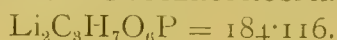
concentrated sulphuric acid it is decomposed, forming a sulphate, water, and carbon monoxide.

Lithium formate has similar properties to other alkali formates. As much as  $1\frac{1}{2}$  grammes ( $22\frac{1}{2}$  grains) has been given daily.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### LITHII GLYCEROPHOSPHAS.

#### LITHIUM GLYCEROPHOSPHATE.



Lithium glycerophosphate,  $\text{Li}_2\text{C}_3\text{H}_7\text{O}_6\text{P}$ , is the lithium salt of glyceryl-phosphoric acid.

It occurs as a white crystalline powder. Soluble in water (1 in 3); insoluble in alcohol. The aqueous solution has an alkaline reaction, should not give any precipitate in the cold with magnesia mixture, or uranium acetate, and not more than a slight opalescence with silver nitrate. The glycerophosphate should be free from heavy metals, barium, phosphoric and sulphuric acids, and it should yield no glycerin to alcohol (absence of free glycerin).

Lithium glycerophosphate is employed with, or in place of, sodium and potassium glycerophosphates in neurasthenia associated with the gouty diathesis, but it possesses little or no therapeutic value. It is best given in solution in water, largely diluted.

*Dose.*— $\frac{1}{2}$  to 1 gramme (8 to 15 grains).

### LITHII GUAIIACAS.

#### LITHIUM GUAIIACATE.

Lithium Oxide ... ..	25.00
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Guaiacum Resin, in powder ... ..	75.00
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Distilled Water, a sufficient quantity.

Dissolve the lithium oxide in a sufficient quantity of distilled water, add the guaiacum resin to the liquid, shake the mixture at intervals until solution is effected, decant the clear liquid, evaporate it to the consistence of a thin syrup, and spread this on glass plates to dry.

The product occurs in greenish-black, transparent scales, with a slightly acrid taste, and a balsamic odour when warmed. Soluble in water.

Lithium guaiacate is employed to relieve the pain and inflammation of chronic gout and rheumatoid arthritis, especially in elderly persons. It is usually prescribed in pills containing 3 decigrams (5 grains) each, massed with syrup of glucose.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

### LITHII HYDROXIDUM.

#### LITHIUM HYDROXIDE.



Lithium hydroxide,  $\text{LiOH}$ , may be obtained by the action of barium hydroxide on lithium sulphate, filtering, evaporating, and heating to



105°; or by boiling lithium carbonate with milk of lime, filtering, and evaporating to dryness.

It occurs as a white crystalline mass resembling sodium hydroxide in appearance, caustic, non-deliquescent, unctuous to the touch. Soluble in water, and apparently not more so in hot than in cold, and less soluble than either sodium hydroxide or potassium hydroxide; slightly soluble in alcohol, insoluble in alcohol-ether. Its solution absorbs carbon dioxide from the air, but less rapidly than the other fixed alkalies. It melts easily at a temperature below redness, forming a fused mass which has a crystalline fracture; it does not volatilise at a white heat. It is similar in taste, causticity, and in its action on vegetable colours to potassium hydroxide and sodium hydroxide. Fused lithium hydroxide as commonly prepared has a powerfully corrosive action on platinum, hence silver vessels should be employed in its preparation. This action, however, has been attributed to the presence of cæsium and rubidium. On evaporating an aqueous solution *in vacuo*, crystals have been obtained, having the composition  $\text{LiOH}$ ,  $\text{H}_2\text{O}$  ( $=42.054$ ); they are slightly hygroscopic.

Lithium hydroxide is not employed in medicine, but is used in the preparation of other compounds of lithium.

## LITHII IODIDUM.

LITHIUM IODIDE.

$\text{LiI} = 134.00.$

Lithium iodide,  $\text{LiI}$ , may be prepared by neutralising a solution of hydriodic acid with lithium carbonate, filtering and evaporating to dryness; or the solution may be evaporated over concentrated sulphuric acid and the crystals thus obtained pressed between folds of filtering paper. These crystals have the composition  $\text{LiI}$ ,  $3\text{H}_2\text{O}$  ( $=188.048$ ).

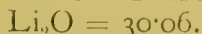
It occurs as a white crystalline powder, or as small, colourless crystals. It is deliquescent, odourless, has a bitter saline taste, and a tendency to become yellow from liberation of iodine. Readily soluble in water and in alcohol. Aqueous solutions are neutral or only very feebly alkaline. If an aqueous solution, to which chlorine water has been added drop by drop, be shaken with chloroform, it colours the latter violet. The salt should be free from the heavy metals, calcium, potassium, sodium, sulphates, chlorides, and free iodine.

Lithium iodide resembles in its properties the iodides of potassium and sodium, but contains a larger proportion of iodine, 94 per cent. It is occasionally employed in place of these salts in chronic gout and rheumatism, and is given in dilute aqueous solution. It is incompatible with alkali carbonates.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**LITHII OXIDUM.**

LITHIUM OXIDE.



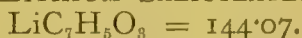
Lithium oxide,  $\text{Li}_2\text{O}$ , may be obtained by direct oxidation of the metal. It is heated in an iron vessel contained in a porcelain tube, through which a current of dry oxygen is passing, at a temperature of  $200^\circ$ . Combination takes place with incandescence. It is cooled in oxygen, and finally heated to decompose any peroxide formed. It is also prepared by heating the nitrate to redness in a silver dish.

It occurs as a white powder, which may be coloured yellowish owing to the presence of small quantities of a higher oxide. Slowly soluble in water, with slight disengagement of heat, forming lithium hydrate. The solution is strongly alkaline, and the taste caustic. Specific gravity, 2.102. Melts below redness. Heated in oxygen, it is superficially changed to peroxide. It is not decomposed on heating with carbon or iron, and does not act on platinum at high temperatures, if pure. It reacts with chlorine, sulphur, and phosphorus.

Lithium oxide is not employed in medicine, but may be used in the preparation of other compounds of lithium.

**LITHII SALICYLAS.**

LITHIUM SALICYLATE.



‡ Lithium salicylate,  $\text{LiC}_7\text{H}_5\text{O}_3$ , may be prepared by heating on a water-bath, to a temperature not above  $60^\circ$ , a mixture of lithium carbonate, salicylic acid in slight excess, and water. The resulting liquid should be filtered through paper free from iron, evaporated at  $60^\circ$ , and the residue finally dried in a drying-oven. The product should contain from 98 to 98.5 of pure lithium salicylate.

It occurs as a white or greyish-white crystalline powder, which exhibits needle-shaped crystals under the microscope; odourless, and having a nauseating, sweet taste. Freely soluble in water (4 in 3), alcohol (1 in 2), and ether. The aqueous solution should be colourless, with a faintly acid reaction. On heating, the salt decomposes, emitting an odour of phenol and leaving an alkaline residue of lithium carbonate. The addition of hydrochloric acid to a concentrated aqueous solution produces a crystalline magma of salicylic acid, which, when collected, washed and dried, should respond to the tests described under Acidum Salicylicum. One part shaken with 15 of concentrated sulphuric acid should not develop a colour within fifteen minutes (absence of organic impurities). It should be free from lead, arsenium, iron, aluminium, calcium, potassium, sulphates, and carbonates, and should not show more than the slightest trace of chlorides.

Lithium salicylate has properties resembling those of sodium salicylate, and has been a favourite remedy in gouty conditions. The salicylic radical assists the excretion of uric acid besides relieving the pain and stiffness of rheumatic joints. Lithium salicylate is best given in aqueous solution, well diluted. It is

incompatible with alkaline carbonates and with mineral acids. Effervescent lithium salicylate may be prepared of the same strength as Lithii Carbonas Effervescens, and is given in similar doses.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

### LITHII URAS.

LITHIUM URATE.



Lithium urate,  $\text{LiHC}_5\text{H}_2\text{N}_4\text{O}_2$ , is an acid urate of lithium, the existence of a normal urate being doubtful.

It occurs as a white granular or crystalline powder. Soluble in cold water (1 in 370); in boiling water (1 in 39); slightly soluble in alcohol. It is more soluble than any of the other alkali urates.

It is used as an anti-arthritic.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

### LITMUS.

LITMUS.

*Synonym.*—Lacmus.

Litmus is a blue pigment, obtained from various lichens, chiefly *Rocella tinctoria*, DC. (Cape Verde), *R. Montagnei*, Bel. (Madagascar and Mozambique), and *Dendrographa leucophæa*, Darbish (California) (N.O. Discomycetes). The coarsely powdered lichen is mixed with pearlash and solution of ammonium carbonate and submitted for several weeks to a slow process of fermentation, during which a red colouring matter is produced, which gradually changes to blue. Chalk and gypsum are then added, the mixture is passed through a sieve, then formed into small rectangular cakes and dried.

It occurs in dark blue or bluish-violet, finely granular, friable, and slightly aromatic, rectangular cakes. Soluble in water and alcohol, forming solutions with a deep blue colour, which is changed to red by acids. To prepare a sensitive indicator, commercial litmus should be exhausted with warm alcohol, which removes a red colouring matter. The residue is macerated with five or six times its weight of cold water, allowed to clear by standing, and then filtered. To the solution thus obtained, diluted sulphuric acid is added, drop by drop, until a little, largely diluted with distilled water, shows a violet colour. It should be kept in open vessels, protected from light and dust, 10 per cent. of alcohol being added if necessary.

In addition to the chalk and gypsum, of which litmus chiefly consists, it contains several colouring matters, viz., erythrolitmin, azolitmin, erythrolein, and spaniolitmin. Of these azolitmin and erythrolitmin appear to be the chief, but they are probably not homogeneous substances. The colouring matter upon which the use of litmus as an indicator depends is a feebly acid, red body, the salts of which have an intense blue colour. The lichens from which litmus is prepared contain lecanoric acid (*R. tinctoria*), erythrin (*R. Montagnei*), and orcin. Lecanoric acid is diorsellinic acid, and is converted by alkalies into orsellinic acid. Erythrin



is erythrite orsellinate, and is converted into erythrite and orsellinic acid. All these substances are colourless. Orsellinic acid yields by further change orcin, from which, by the action of air in the presence of ammonium carbonate, the colouring matters are produced. These appear to be oxidation products of amino-orcinol.

Litmus is much employed as an indicator, being rendered blue by alkalies and red by acids. As its colour is affected by carbonic acid, titrations in which carbon dioxide gas is liberated are better conducted with methyl orange as the indicator.

**NOTE**—Solution of litmus is prepared by boiling 10 of litmus with 40 of alcohol, repeating the operation twice with 30 of alcohol, digesting the washed litmus in 100 of distilled water, and filtering.

## LOBELIA.

### LOBELIA.

*Synonym.*—Indian Tobacco.

Lobelia consists of the flowering plant, *Lobelia inflata*, Linn. (N.O. Lobeliaceæ), collected and dried. The plant is an annual herb, indigenous to, and cultivated in, the eastern United States.

The stems, which are abundantly present, are angular and channelled, slightly winged, hairy, and greenish in colour in the upper part, but glabrous, and often purplish in the lower. The leaves are alternate, ovate, sessile, or shortly petiolate. They have an irregular, crenate-dentate margin, and bear bristly hairs, especially on the under surface. The flowers are not as a rule present in the drug, but the capsular fruits are frequently to be found. These are two-celled, and when ripe contain minute, oblong, reticulated seeds. Transverse sections of stem and leaves show laticiferous vessels in the bast. Odour slightly irritating; taste burning and acrid.

The chief constituent of the drug is the yellow, liquid alkaloid lobeline, which darkens on keeping; it forms crystalline salts. Other constituents are a neutral, crystalline, inactive body called inflatin, lobelic acid, resin, wax, volatile and fixed oils. It yields about 10 per cent. of ash.

Lobelia is used for its action in depressing the vaso-motor centre and peripheral vagus, thus producing dilatation of the bronchioles by relaxing the bronchial muscles. Lobeline has an action very closely resembling that of nicotine. It first excites nerve cells and then paralyzes them. The stimulation is pronounced, though transient, and it is for this stimulant action that the drug is always used in therapeutics. Lobelia is given in spasmodic asthma, in the dyspnoea of chronic bronchitis, and in other affections of the air passages. It is a common ingredient of powders intended to be burnt for asthma (see *Pulvis Lobeliæ Compositus* and *Pulvis Stramonii Compositus*). For internal use, the tincture and ethereal tincture are commonly employed; some authorities recommend the use of large doses frequently repeated until nausea is produced. Lobelia is also an expectorant in laryngeal and bronchial catarrh. Its action in spasmodic asthma is enhanced by combination with sodium iodide or bromide. Large

doses are diuretic, cathartic, and emetic; they may cause collapse through medullary paralysis. In case of poisoning by lobelia, stimulants should be freely employed and the stomach evacuated.

*Dose*.—2 to 6 decigrams (3 to 10 grains).

NOTE.—Lobelia, U.S.P., consists of the dried leaves and tops of *L. inflata*, collected after some of the capsules have become inflated.

### LOTIO ACIDI BORICI.

#### BORIC ACID LOTION.

Boric Acid	...	...	...	...	3'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the boric acid in the water.

Boric acid lotion is largely employed as a mild antiseptic in surgery. It is used as a hot fomentation constantly applied to ulcers, boils, whitlows, carbuncles, etc.

### LOTIO ACIDI CARBOLICI.

#### CARBOLIC ACID LOTION.

Carbolic Acid, in crystals	...	...	...	5'00
Distilled Water, warm, sufficient to produce	...	...	...	100'00

Dissolve the carbolic acid in the water.

This lotion is used as an antiseptic in surgery, the 5 per cent. solution killing fully developed bacteria. Usually, however, the lotion is diluted with water before use. It is effective in allaying irritation arising from the bites of insects. It may be employed to disinfect instruments, fæces, and utensils.

NOTE.—Care should be taken to insure that the whole of the carbolic acid is dissolved, as a portion is liable to fall to the bottom and form an oily layer of liquefied carbolic acid.

### LOTIO ACIDI CARBOLICI ET BORACIS.

#### CARBOLIC ACID AND BORAX LOTION.

Glycerin of Carbolic Acid	...	...	...	10'00
Glycerin of Borax	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	100'00

Mix the glycerins with the water.

This lotion is an excellent, antiseptic gargle and mouth wash, especially useful in the sick room. It should be diluted with five to ten times its volume of water.

### LOTIO ACIDI PICRICI.

#### PICRIC ACID LOTION.

Picric Acid	...	...	...	...	1'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the picric acid in the water. To be diluted with one or more parts of water, as required.

This lotion is used as an application to burns and scalds, but should not be applied over large surfaces, as toxic symptoms may arise from absorption. It is also applied to the skin in eczema, erysipelas, and other inflammatory conditions. Stains on the skin caused by picric acid may be removed by means of a solution containing 1 per cent. each of boric acid and sodium benzoate.

### LOTIO BENZOINI.

#### BENZOIN LOTION.

*Synonym.*—Lait Virginal.

Simple Tincture of Benzoin ...	...	...	2'50
Rose Water, sufficient to produce ...	...	...	100'00

Mix the tincture with the rose water.

This lotion is employed as a cosmetic for the skin. It is sometimes prepared with the addition of 4 per cent. of glycerin.

NOTE.—An excellent toilet preparation (Lotio Benzoini Composita) is made by mixing 6 of simple tincture of benzoin, 3 of tincture of quillaia, and 6 of eau de Cologne, or other perfumed essence, with sufficient distilled water to make the product measure 100.

### LOTIO CALAMINÆ.

#### CALAMINE LOTION.

Prepared Calamine ...	...	...	10'00
Zinc Oxide ...	...	...	5'00
Glycerin ...	...	...	5'00
Rose Water, sufficient to produce ...	...	...	100'00

Triturate the calamine and zinc oxide with the rose water, and add the glycerin.

Calamine lotion is used as a mild astringent and soothing lotion for the skin, in eczema and acne; it is also used to remove roughness and redness due to exposure. Pigmentum Calaminæ should be employed when a thicker preparation is required.

### LOTIO CRINALIS.

#### HAIR LOTION.

Almond Oil ...	...	...	12'50
Strong Solution of Ammonia ...	...	...	12'50
Oil of Rosemary ...	...	...	0'50
Alcohol ...	...	...	50'00
Honey Water, sufficient to produce ...	...	...	100'00

Mix the almond oil with the solution of ammonia, and add the other ingredients, previously mixed together.

This is a stimulating lotion, resembling one used by Sir Erasmus Wilson, and commonly called by his name. It is also prepared without oil.

NOTE.—Sir Charles Locock's hair lotion or wash is prepared by mixing 120 grains of expressed oil of nutmeg or mace, 21 minims of oil of rosemary, and 7 fluid drachms each of olive oil, solution of ammonia, and tincture of cantharides, with sufficient diluted rose water to produce 10 fluid ounces.



**LOTIO EVAPORANS.**

## EVAPORATING LOTION.

Alcohol ...	...	...	...	...	...	20'00
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Mix the alcohol with the water.

This lotion is used as a cooling dressing for sprains and bruises. It is sometimes prepared with methylated spirit.

**LOTIO GLYCERINI COMPOSITA.**

## COMPOUND GLYCERIN LOTION.

White Beeswax ...	...	...	...	...	...	2'50
Lard ...	...	...	...	...	...	3'75
Hard Soap, in powder ...	...	...	...	...	...	2'50
Salicylic Acid ...	...	...	...	...	...	0'02
Glycerin ...	...	...	...	...	...	2'50
Almond Oil ...	...	...	...	...	...	3'75
Oil of Rose ...	...	...	...	...	...	0'10
Chloroform ...	...	...	...	...	...	0'50
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Heat the beeswax and lard with the almond oil, on a water-bath, until melted, and pour the mixture into a warm mortar; then add the soap, salicylic acid, glycerin, oil of rose, and chloroform, with sufficient distilled water to produce 100 by volume.

NOTE.—If about one-tenth of the distilled water in the above formula be replaced by neutral cucumber juice, the product will resemble preparations sold under the name "Glycerin and Cucumber."

**LOTIO HYDRARGYRI ACETICA.**

## ACETIC LOTION OF MERCURY.

Mercuric Chloride ...	...	...	...	...	...	0'20
Acetic Acid ...	...	...	...	...	...	8'00
Glycerin ...	...	...	...	...	...	8'00
Alcohol ...	...	...	...	...	...	27'50
Rose Water, sufficient to produce	...	...	...	...	...	100'00

Dissolve the mercuric chloride in the mixed liquids.

This lotion is used to destroy pediculi, and to detach their ova.

**LOTIO HYDRARGYRI FLAVA.**

## YELLOW MERCURIAL LOTION.

*Synonym.*—Yellow Wash.

Mercuric Chloride ...	...	...	...	...	...	0'45
Solution of Lime ...	...	...	...	...	...	100'00

Mix the mercuric chloride with the solution of lime.

This lotion is used as an application to venereal sores.

**LOTIO HYDRARGYRI NIGRA.**

BLACK MERCURIAL LOTION.

*Synonym.*—Black Wash.

Mercurous Chloride	...	...	...	...	0·70
Glycerin	...	...	...	...	5·00
Mucilage of Tragacanth	...	...	...	...	12·50
Solution of Lime, sufficient to produce...	...	...	...	...	100·00

Mix the glycerin with the mucilage, triturate the mercurous chloride with the mixture, add 20 of the solution of lime, shake vigorously and add sufficient solution of lime to make up the required volume.

This lotion is used as an application to venereal sores and foul ulcers.

**LOTIO HYDRARGYRI PERCHLORIDI.**

MERCURIC CHLORIDE LOTION.

Mercuric Chloride	...	...	...	...	0·20
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the mercuric chloride in the distilled water.

This lotion is used as an antiseptic in surgery, after dilution with 2 to 10 parts of water. It is also employed, diluted with 10 parts of water, as a vaginal injection. If ordinary water be used instead of distilled water a slight deposit will form on standing.

NOTE.—This lotion is sometimes coloured with fuchsine or methylene blue, about 1 in 5000.

**LOTIO PICIS CARBONIS ALKALINA.**

COAL TAR LOTION.

Solution of Coal Tar	...	...	...	...	0·50
Sodium Bicarbonate	...	...	...	...	1·25
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the sodium bicarbonate in the water and add the solution of coal tar.

This is a mildly stimulant and antiseptic lotion used in chronic eczema and other conditions of the skin. It is a valuable remedy for local irritation.

**LOTIO PLUMBI.**

LEAD LOTION.

Strong Solution of Lead Subacetate	...	...	...	...	1·25
Distilled Water, sufficient to produce	...	...	...	...	100·00

Add the strong solution of lead subacetate to the distilled water.

This is an astringent and sedative lotion for application to sprains, bruises, and all acute inflammations of the skin without abrasions.

NOTE.—This lotion is slightly opalescent when made with distilled water, and with ordinary water a more or less heavy deposit forms, according to the proportion of alkali sulphates, chlorides, and carbonates in the water.

**LOTIO PLUMBI ACETATIS.**

## LEAD ACETATE LOTION.

Lead Acetate	...	...	...	...	0·50
Diluted Acetic Acid	...	...	...	...	0·50
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the lead acetate in the diluted acetic acid and sufficient distilled water to make the product measure 100.

This lotion is an astringent and sedative application for sprains, bruises, and cutaneous inflammations.

**LOTIO PLUMBI CUM OPIO.**

## LEAD AND OPIUM LOTION.

Tincture of Opium	...	...	...	...	5·00
Lead Lotion, sufficient to produce	...	...	...	...	100·00

Mix the tincture of opium with the lead lotion.

This is an astringent lotion, and is used chiefly for sprains and bruises.

**LOTIO PLUMBI ET SULPHURIS.**

## LEAD AND SULPHUR LOTION.

*Synonym.*—Sulphur Hair Restorer.

Lead Acetate, in powder	...	...	...	...	1·75
Precipitated Sulphur	...	...	...	...	3·50
Glycerin	...	...	...	...	12·50
Distilled Water, sufficient to produce...	...	...	...	...	100·00

Mix the lead acetate and precipitated sulphur intimately, triturate with the glycerin, and gradually add sufficient distilled water to make up the required volume.

This lotion resembles many advertised "hair restorers," and is a slow-acting dye, the hair-shafts being stained by the gradual formation of lead sulphide. The lotion may be perfumed if desired.

**LOTIO PLUMBI EVAPORANS.**

## EVAPORATING LEAD LOTION.

Strong Solution of Lead Subacetate	...	...	...	...	1·25
Alcohol	...	...	...	...	20·00
Distilled Water, sufficient to produce...	...	...	...	...	100·00

Mix the liquids.

This is a cooling lotion for application to sprains and bruises.

**LOTIO RESORCINI.**

## RESORCIN LOTION.

*Synonym.*—Audeer's Lotion.

Resorcin	...	...	...	...	10·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the resorcin in the distilled water.

This preparation is used as a paint in psoriasis and chronic eczema; also as an antiseptic application to syphilitic sores.



**LOTIO RUBRA.**

RED WASH.

Zinc Sulphate	...	...	...	...	0·50
Compound Tincture of Lavender	...	...	...	...	2·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the zinc sulphate in the mixed liquids.

This is an astringent lotion. It is applied to indolent ulcers and wounds to assist granulation. It is also a valuable application for chronic inflammation of mucous membranes, such as conjunctivitis and gonorrhœa.

**LOTIO SODÆ CHLORINATÆ.**

CHLORINATED SODA LOTION.

Solution of Chlorinated Soda	...	...	...	10·00
Distilled Water, sufficient to produce	...	...	...	100·00

Mix the liquids.

This is a deodorising and antiseptic lotion for application to foul ulcers. It should be diluted with one or more volumes of water before use.

**LOTIO STAPHISAGRIÆ.**

STAVESACRE LOTION.

*Synonym.*—Nursery Hair Lotion.

Stavesacre Seeds, in coarse powder	...	...	...	10·00
Acetic Acid	...	...	...	5·00
Alcohol	...	...	...	10·00
Oil of Geranium	...	...	...	0·025
Oil of Lavender	...	...	...	0·025
Oil of Lemon	...	...	...	0·05
Glycerin	...	...	...	5·00
Distilled Water, sufficient to produce	...	...	...	100·00

Boil the powdered stavesacre seeds with the acetic acid and 80 of the water for ten minutes in a covered vessel, set aside till cold, then add the oils, previously dissolved in the alcohol, filter, add the glycerin, and make up to the required volume with water.

This preparation is employed as a lotion for children's hair, being used to kill pediculi and their ova. It should be applied daily.

**LOTIO SULPHURIS.**

SULPHUR LOTION.

Precipitated Sulphur	...	...	...	...	6·00
Glycerin	...	...	...	...	3·00
Alcohol	...	...	...	...	12·50
Rose Water	...	...	...	...	40·00
Lime Water, sufficient to produce	...	...	...	...	100·00

Triturate the precipitated sulphur with the glycerin, and add the other liquids.

This lotion is used in acne and other skin diseases.

**LOTIO ZINCI CHLORIDI.****ZINC CHLORIDE LOTION.**

Zinc Chloride	...	...	...	...	0·25
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the zinc chloride in the distilled water.

This lotion is used as an astringent and antiseptic eye lotion, and as an injection in gonorrhœa and leucorrhœa. It is sometimes diluted with an equal quantity of water, and insoluble zinc oxychloride, formed by dissociation, may then be precipitated; it is preferable to decant the clear liquid from this precipitate rather than add hydrochloric acid to form a clear solution.

**LOTIO ZINCI SULPHATIS.****ZINC SULPHATE LOTION.**

Zinc Sulphate	...	...	...	...	0·50
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the zinc sulphate in the water.

This lotion is a stimulant application to indolent ulcers and granulating wounds. It is used as an injection in leucorrhœa and gonorrhœa, and diluted with an equal quantity of water as an astringent eye lotion.

**LOTIO ZINCI SULPHOCARBOLATIS.****ZINC SULPHOCARBOLATE LOTION.**

Zinc Sulphocarbolate	...	...	...	...	0·75
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the zinc sulphocarbolate in the water.

This preparation is used as an astringent and antiseptic injection in gonorrhœa and leucorrhœa.

**LUPULINUM.****LUPULIN.**

Lupulin consists of the glandular trichomes separated from the strobiles of *Humulus Lupulus*, Linn. (N.O. Urticaceæ). The glands, which are distributed over the bases of the bracts, over the fruits, and, to a less degree, over the stipules, may be separated by shaking and beating the hops.

The drug occurs in a granular, brownish-yellow powder, with the strong odour and bitter, aromatic taste characteristic of hops. Examined under the microscope the glands are seen to be more or less rounded or broadly ovoid, and to measure from  $140\mu$  to  $200\mu$  in diameter; the upper portion is bounded by a thin cuticle, the lower by a single hemispherical layer of cells. They readily burst on the application of slight pressure, and discharge their granular oleo-resinous contents.

The chief constituent of lupulin is about 3 per cent. of volatile oil, which consists chiefly of a sesquiterpene humulene, together with various oxygenated bodies, to which the oil owes its peculiar odour. Other constituents are  $\alpha$ - and  $\beta$ -lupamaric acids, choline, resin, and wax (see notes on *Lupulus*). It should contain not more than 40 per cent. of matter insoluble in ether, and should yield not more than 12 per cent. of ash on incineration.

Lupulin is an aromatic bitter and is reputed to be mildly sedative. It is occasionally employed as a hypnotic, either in pills or enclosed in a cachet. It may be made into a pill with strong alcohol as an excipient. Preparations of lupulin are not much used in this country, but an extract, an oleoresin, and a tincture are prepared.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

NOTES.—Commercial lupulin is often of very inferior quality, and may consist of the sifted sweepings from the floors of hop kilns. A dark colour and disagreeable odour indicate an old drug, the latter character being attributed to the presence of valerianic acid, which is produced gradually from the resin; the ash may rise to 25 per cent., or even more, while the percentage insoluble in ether may be more than 40.

## LUPULUS.

### HOPS.

*Synonymi*.—*Humulus*.

Hops are the dried fruits (strobiles) of *Humulus Lupulus*, Linn. (N.O. Urticacæ), collected from cultivated plants. The hop is a climbing plant growing in Europe generally, but largely cultivated in England, Germany, Russia, California, etc. It is dioecious, but the pistillate plant only is cultivated. The hops are picked when they are fully developed, dried in kilns, and frequently exposed to the fumes of burning sulphur. They are then packed into bales known as "pockets." The strobiles are about 3 centimetres long, ovoid in shape, and consist of a number of imbricated yellowish-green membranous bracts and stipules attached to a hairy zigzag axis. Each of the bracts enfolds at the base a small fruit (achene), both fruit and bract being sprinkled with yellow, translucent glands.

Fresh hops possess a bitter, aromatic taste, and a strong, characteristic aromatic odour. The latter, however, changes and becomes distinctly unpleasant as the hops are kept. This change is ascribed to oxidation of the soft resin with production of valerianic acid.

The aromatic odour of hops is due to volatile oil, of which they yield about 0.3 to 1.0 per cent.; it appears to consist chiefly of the sesquiterpene humulene. Petroleum spirit extracts a soft resin (7 to 14 per cent.) and ether a hard resin. The petroleum spirit extract contains the two crystalline bitter principles,  $\alpha$ -lupamaric acid (humulone), and  $\beta$ -lupamaric acid (lupulinic acid). These bodies are chiefly contained in the glands. The leafy organs contain



about 5 per cent. of tannin, which is not a constituent of the glands. Hops yield about 7 per cent. of ash.

Hops have the action of the aromatic bitters. The infusion is employed as a vehicle especially for bitters and tonics; the tincture is stomachic and is used to improve the appetite and digestion. Both preparations were formerly believed to be sedative and were given at bedtime to induce sleep. Hops are also made up into pillows on the superstition that they induce sleep. Preparations of hops are incompatible with mineral acids and metallic salts.

*Dose.*—1 to 2 grammes (15 to 30 grains).

*NOTE.*—On account of the rapid change in the odour of hops, the recently dried fruits should alone be used; these may be recognised by the characteristic odour and distinctly greenish colour.

## LYCOPodium.

### LYCOPodium.

Lycopodium consists of the spores of the common club moss, *Lycopodium clavatum*, Linn. (N.O. Lycopodiaceæ), and other species of *Lycopodium*. This club moss is a creeping plant indigenous to Europe, Asia, and North America, but the drug is collected chiefly in Russia. The plant produces fruiting branches, usually in pairs, resembling slender elongated cones. These bear sporophylls, at the base of each of which is a reniform sporangium enclosing a number of minute spores. When ripe the sporangium opens, and the spores escape. The drug is obtained in July and August by beating and shaking the plants, and sifting the yellowish powder thus obtained.

It occurs as a pale yellow, very mobile, inodorous, tasteless powder, which floats upon the surface of water without being wetted. It consists entirely of minute ( $25\mu$ ) spores, having the shape of a triangular pyramid with a convex base. Each spore is minutely reticulated, and exudes when crushed a droplet of oil. Lycopodium contains about 50 per cent. of fixed oil, which can be obtained by triturating with fine sand or pumice stone, and extracting with ether. It yields when pure from 1 to 2 per cent. of ash.

The drug is often adulterated, but its appearance under the microscope is so characteristic that sophistication can easily be detected. Among the substances chiefly employed for this purpose are starch, pine pollen, and powdered resin (colophony, amber, etc.). Powdered wood and bark, sulphur, and various other substances have also been detected. It is best mounted for microscopical examination by moistening with alcohol, and immediately adding water or dilute glycerin. A little should also be mounted in fixed oil or liquid paraffin, and other media for comparison.

Lycopodium is employed in dispensing as a covering for pills. It does not attract moisture and affords some protection to pills composed of hygroscopic substances. It is used as an inert, dusting powder for the skin to soothe inflamed surfaces and prevent friction. On account of its lightness it is a convenient diluent for insufflations of boric acid, tannin, etc., for the throat, nose, and ear; it is also

employed as the basis of snuffs containing menthol, camphor, cocaine etc., for use in nasal catarrh. A tincture of lycopodium is prepared, and has been prescribed for incontinence of urine and to allay spasm and irritation of the bladder.

NOTE.—*Lycopodium Hungaricum* is pine pollen collected in Hungary; the grains of which it consists are ovoid, and bear an enlargement at each extremity.

### MAGNESIA LEVIS.

LIGHT MAGNESIA.



*Synonyms*.—Magnesia; Light Calcined Magnesia; Magnesii Oxidum; Magnesium Oxide.

Light magnesia,  $\text{MgO}$ , is prepared by exposing light magnesium carbonate to a dull red heat until free from carbon dioxide.

It occurs as a fine, bulky, white powder, odourless, and having an earthy and slightly alkaline taste; it slowly absorbs moisture and carbon dioxide from the air, and is very infusible, giving out a clear white light when strongly heated. Slightly soluble in water, insoluble in alcohol, readily soluble in diluted acids, forming salts. Distilled water with which it has been shaken has a faintly alkaline reaction. With fifteen times its weight of water it forms on standing for about half an hour a gelatinous mass. Distilled water with which it has been boiled, when cooled, filtered, and evaporated to dryness, should leave a residue corresponding to not more than 0.5 per cent. of the weight of magnesium oxide. If 1 decigram be heated to boiling with 5 mls water, cooled, and poured into an equal volume of acetic acid, it should dissolve, and show not more than a few isolated gas bubbles (limit of carbonate). It should lose very little weight (not more than 7 per cent.) when exposed to a low red heat, and should be free from iron, arsenium, aluminium, calcium, and from more than traces of chlorides or sulphates.

Magnesium oxides are employed as antacids and laxatives, especially for children. They neutralise acidity of the stomach in dyspepsia and heartburn; allay sickness, especially the vomiting of pregnancy, and render the secretions less acid in gouty and rheumatic conditions. In the intestine they act as mild laxatives; if repeatedly administered concretions may be formed in the intestines. After absorption, as when injected subcutaneously, the action of the  $\text{Mg}$  ion resembles in its action that of calcium in increasing the coagulability of the blood, and magnesium oxide and carbonate have therefore been recommended for use in functional albuminuria and to cure chilblains. The oxides of magnesium are better suited for dispensing in powder form than in mixtures; for the latter purpose the carbonates are preferred. Light magnesia does not mix readily with water, but its miscibility may be much improved by pouring a few drops of alcohol over the floating powder. Milk is a suitable vehicle for its administration. Light magnesia is much

employed in combination with rhubarb and ginger as Gregory's Powder. It is an excellent dentifrice, neutralising acid secretions, and efficiently cleansing the teeth.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

NOTES.—Commercial samples of light magnesia have been found to contain from 0.62 to 1.65 per cent. of carbon dioxide, and to lose from 4.7 to 7.4 per cent. in weight on heating to dull redness. Magnesii Oxidum, U.S.P., should not lose more than 15 per cent. of its weight on exposure to a low red heat.

## MAGNESIA PONDEROSA.

HEAVY MAGNESIA.

$\text{MgO} = 40.36.$

*Synonyms.*—Heavy Calcined Magnesia; Magnesii Oxidum Ponderosum; Heavy Magnesium Oxide.

Heavy magnesia,  $\text{MgO}$ , is prepared by exposing heavy magnesium carbonate to a dull red heat until free from carbon dioxide.

It occurs as a fine, white powder, which should comply with the characters and tests given under "Magnesia Levis." It differs from the latter, however, in its density, being three and a-half times as heavy, and in not readily forming a gelatinous mass with water.

The medicinal properties of heavy magnesia closely resemble those of the light variety, but its smaller bulk renders it more convenient in use, it is more readily miscible with water, and small doses may be enclosed in cachets. It is occasionally used to prepare pills containing oleoresins, but they are prone to become insoluble.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

NOTE.—The statements in the notes under Magnesia Levis apply equally to heavy magnesia.

## MAGNESII BOROCITRAS.

MAGNESIUM BOROCITRATE.

Magnesium borocitrate may be prepared by stirring a mixture of magnesium oxide, 3 parts; powdered boric acid, 3 parts; and powdered citric acid, 10 parts; with distilled water, 4 parts, to form a pasty mass. This in a short time hardens, and may be powdered; or it may be spread on glass plates and scaled off.

It occurs as a white powder, or in colourless, shining scales, having a bitterish taste and a weak acid reaction. It is slowly soluble in cold water; more quickly on heating. A small quantity of water converts it into a thick liquid; but with a larger quantity it dissolves to form a clear solution. On heating it swells and then chars, and if the carbonised residue be dissolved in water acidulated with hydrochloric acid, filtered, and excess of ammonium carbonate added, the solution should remain clear. The addition of sodium phosphate solution causes a crystalline precipitate. Magnesium borocitrate should be free from calcium and tartrates.

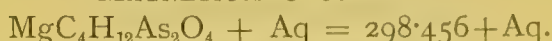


It is employed as a urinary antiseptic in chronic cystitis, stone, and gravel. A mixture of magnesium borocitrate with twice its weight of sugar (*Pulvis Magnesium Borocitratis Compositus*) is sometimes prescribed under the name "Boracite"—a term which was originally, and more properly, applied to a native calcium borate.

*Dose.*—1 to 2 grammes (15 to 30 grains).

### MAGNESII CACODYLAS.

#### MAGNESIUM CACODYLATE.



Magnesium cacodylate,  $[(\text{CH}_3)_2\text{AsO}_2]_2\text{Mg} + \text{Aq}$ , is the magnesium salt of cacodylic acid.

It occurs as a white, neutral, amorphous powder. Readily soluble in water. The 45 per cent. aqueous solution is syrupy, the 25 per cent. solution slightly viscous, but may be employed subcutaneously. The salt is very rich in cacodylic acid, 1 gramme containing the equivalent of 0.92 gramme of the acid, or 0.48 gramme of arsenium.

Magnesium cacodylate has similar properties to those of the sodium salt, both chemically and therapeutically.

*Dose.*—15 to 45 milligrams ( $\frac{1}{4}$  to  $\frac{3}{4}$  grain).

### MAGNESII CARBONAS LEVIS.

#### LIGHT MAGNESIUM CARBONATE.



*Synonyms.*—Magnesii Carbonas; Magnesium Carbonate.

Light magnesium carbonate,  $3(\text{MgCO}_3), \text{Mg}(\text{HO})_2, 4\text{H}_2\text{O}$ , may be prepared by dissolving 10 of magnesium sulphate in 80 of distilled water, adding a solution of 12 of sodium carbonate in 80 of distilled water, boiling for fifteen minutes, then collecting the precipitated magnesium carbonate on a calico filter, washing with boiling water until free from sulphates, and drying at a temperature not exceeding  $100^\circ$ .

It occurs as a very light, white powder. Insoluble in water, and otherwise corresponding to the characters and tests described under *Magnesii Carbonas Ponderosus*.

The medicinal properties of light magnesium carbonate are virtually those of *Magnesia Levis*. It is the "magnesia" of common parlance, the light carbonate being the usual form of magnesia in powder employed for domestic use. For dispensing purposes, the heavy carbonate is employed in the absence of instructions to the contrary. The light carbonate is often given with magnesium sulphate, in the form of *Mistura Alba*, but the heavy carbonate may be used instead.

*Dose.*—3 to 20 decigrams (5 to 30 grains), for repeated administration; for a single administration, 20 to 40 decigrams (30 to 60 grains).

**MAGNESII CARBONAS PONDEROSUS.**

HEAVY MAGNESIUM CARBONATE.



Heavy magnesium carbonate,  $3(\text{MgCO}_3)$ ,  $\text{Mg}(\text{HO})_2$ ,  $4\text{H}_2\text{O}$ , may be prepared in the same way as the light carbonate, but only one-fourth the quantity of distilled water is used to dissolve each of the salts employed, and the mixed solutions are evaporated to dryness. The residue is washed repeatedly with distilled water until free from sulphates, and dried at a temperature not exceeding  $100^\circ$ .

It occurs as a white granular powder. Insoluble in water, but soluble with effervescence in diluted mineral acids. In calcination 5 grammes should yield a residue weighing 2.1 grammes. The carbonate should be free from iron, aluminium, or calcium, and contain not more than traces of chlorides or sulphates.

The medicinal properties of heavy magnesium carbonate are virtually those of *Magnesia Ponderosa*. It is the form of magnesium carbonate commonly employed in dispensing, in the absence of instructions to the contrary; it is often given in mixtures, cachets, lozenges, or powder, or as *Liquor Magnesii Carbonatis*.

*Dose*.—3 to 20 decigrams (5 to 30 grains), for repeated administration; for single administration, 20 to 40 decigrams (30 to 60 grains).

**MAGNESII GLYCEROPHOSPHAS.**

MAGNESIUM GLYCEROPHOSPHATE.



Magnesium glycerophosphate,  $\text{MgPO}_3\text{OC}_3\text{H}_5(\text{OH})_2$ , may be prepared by neutralising glycerophosphoric acid with magnesium carbonate and filtering, the magnesium salt being precipitated from the filtrate by alcohol, and finally dried over sulphuric acid.

It occurs as a white, amorphous powder. Soluble in water. Magnesium glycerophosphate has properties similar to those of the calcium salt. The most characteristic reactions of the glycerophosphates generally are the immediate precipitation with ammonium molybdate, precipitation with silver nitrate soluble in excess of water, and the formation with lead acetate of a white precipitate soluble in acetic acid.

Magnesium glycerophosphate has the general properties of the glycerophosphates (see *Acidum Glycerophosphoricum*), and is used for its acid radical rather than for the small proportion of magnesium present. The  $\text{Mg}$  ion is not absorbed, and there is not sufficient salt present to cause a cathartic action. It may be given in solution in water flavoured with syrup of orange or orange-flower water.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

**MAGNESII HYPOPHOSPHIS.**

MAGNESIUM HYPOPHOSPHITE.



Magnesium hypophosphite,  $\text{Mg}(\text{H}_2\text{PO}_2)_2, 6\text{H}_2\text{O}$ , may be prepared by boiling magnesium oxalate with a solution of calcium hypophosphite; filtering the solution and allowing to crystallise.

It occurs in white crystals (regular octahedrons with faces of cubes). Soluble in water. On heating it is decomposed, the products being phosphate, phosphoretted hydrogen, and water.

Magnesium hypophosphite has properties resembling those of calcium hypophosphite, and is employed for similar purposes. For all practical purposes it may be regarded as having a mild salt action. It may be given in solution in water flavoured with syrup of orange or orange-flower water. It is incompatible with alkali carbonates.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

**MAGNESII LACTOPHOSPHAS.**

MAGNESIUM LACTOPHOSPHATE.

Magnesium lactophosphate, so-called, is a mixture of magnesium phosphate,  $\text{MgHPO}_4, 3\text{H}_2\text{O}$ , and magnesium lactate,  $\text{Mg}(\text{C}_3\text{H}_5\text{O}_3)_2, 3\text{H}_2\text{O}$ .

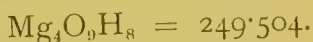
It occurs as a white powder. Soluble in water.

Magnesium lactophosphate has properties resembling those of calcium lactophosphate, but it is seldom used. It is best given in cachets, or in solution in water, the solution being flavoured with syrup of orange or orange-flower water.

*Dose.*—2 to 10 decigrams (3 to 15 grains).

**MAGNESII PEROXIDUM.**

MAGNESIUM PEROXIDE.



Magnesium peroxide,  $[\text{Mg}(\text{OH})_2]_3\text{MgO}(\text{OH})_2$ , may be prepared by adding hydrogen peroxide (three volumes), 100 parts, to calcined magnesia, 5 parts, and keeping them in contact for a day or two at the ordinary temperature. The mixture is then filtered, washed, and dried at  $100^\circ$  to  $105^\circ$ . It is said to have the above composition, but there is much uncertainty on this point.

It occurs as a white powder, tasteless and having an alkaline reaction. It is more stable than hydrogen peroxide at a temperature of  $100^\circ$ ; at about  $300^\circ$ , however, it loses all its active oxygen. With ordinary reagents it gives the well-known reactions of hydrogen peroxide, and the characteristic blue colour on addition of diluted sulphuric acid and a bichromate. Diluted acids liberate oxygen.

Commercial varieties of magnesium peroxide contain from 15 to 20 per cent. of  $\text{MgO}_2$ , with 75 to 85 per cent. of  $\text{MgO}$ . It is a powerful oxidising agent and disinfectant, and is employed to arrest gastric and intestinal fermentation in diarrhoea, especially in that of



phthisis and in typhoid fever. For its action in the stomach it may be given in cachets, or the powder may be mixed with water at the time of taking; as an intestinal antiseptic it may be given in glutoid capsules. It is a useful antiseptic for the mouth, and may, with advantage, be added to tooth powders (see *Magnesii Peroxidum cum Creta*).

*Dose*.—2 to 4 grammes (30 to 60 grains).

NOTE.—Magnesium peroxide is also known under the trade-names Biogen, Hopogan, and Magnesium Perhydrol.

## MAGNESII PEROXIDUM CUM CRETA.

MAGNESIUM PEROXIDE WITH CHALK.

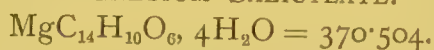
*Synonym*.—Oxygenated Tooth Powder.

Magnesium Peroxide	...	...	...	...	10·00
Hard Soap, in powder	...	...	...	...	2·50
Menthol	...	...	...	...	0·10
Oil of Rose	...	...	...	...	0·25
Oil of Wintergreen	...	...	...	...	0·50
Precipitated Chalk, heavy, sufficient to produce	100·00				

Triturate the menthol with the oils, and mix intimately with 10 of the precipitated chalk; then add the magnesium peroxide, soap, and sufficient precipitated chalk to make up to the required weight.

## MAGNESII SALICYLAS.

MAGNESIUM SALICYLATE.



Magnesium salicylate,  $\text{Mg}(\text{C}_7\text{H}_5\text{O}_3)_2, 4\text{H}_2\text{O}$ , may be prepared by neutralising a hot solution of salicylic acid with iron-free magnesium carbonate, filtering and evaporating the solution (in which the acid should be in slight excess) to crystallisation.

It occurs in colourless, silky needles, or as a white crystalline powder (a pink tint would indicate the presence of a trace of iron) with a sweetish but somewhat bitter taste. Readily soluble in water and alcohol. Its aqueous solution should be free from turbidity, and a strong solution acidified with hydrochloric acid yields a crystalline magma of salicylic acid. Heated to somewhat over  $100^\circ$  it loses its water of crystallisation. On ignition it leaves a white residue of magnesium oxide. If 10 mls of a 10 per cent. aqueous solution be shaken with 10 mls of ether the latter on evaporation should not leave more than a very minute trace of residue (freedom from salicylic acid). It should not contain more than traces of chlorides and sulphates.

Magnesium salicylate has properties resembling those of the alkali salicylates, and has been specially recommended for use in typhoid fever and to disinfect the alimentary canal, since it is less readily absorbed than the other salicylates. It may be given in

cachets or in solution in water. It is incompatible with alkali carbonates.

*Dose.*— $\frac{1}{2}$  to 2 grammes (8 to 30 grains).

### MAGNESII SULPHAS.

MAGNESIUM SULPHATE.

$\text{MgSO}_4, 7\text{H}_2\text{O} = 246.532.$

*Synonym.*—Epsom Salt.

Magnesium sulphate,  $\text{MgSO}_4, 7\text{H}_2\text{O}$ , is prepared in large quantities from the mineral kieserite,  $\text{MgSO}_4, \text{H}_2\text{O}$ , which is almost insoluble in water, but is gradually converted into Epsom salt by prolonged contact with water; it is also prepared from magnesite, a native magnesium carbonate, by dissolving it in diluted sulphuric acid and allowing the solution to crystallise.

It occurs in small, colourless, translucent, prismatic needles or rhombic prisms, odourless, and having a cooling, saline, and bitter taste. Soluble in cold water (10 in 13); in boiling water (20 in 3); insoluble in alcohol. The aqueous solution is neutral to litmus paper. On prolonged heating at  $150^\circ$  to  $160^\circ$  it loses six-sevenths of its water; the remaining water is only expelled at about  $280^\circ$ . The purity of the salt is determined by precipitating as magnesium ammonium phosphate, igniting and weighing as magnesium pyrophosphate, when 97.4 per cent. should be indicated. It should be free from iron, arsenium, aluminium, zinc, calcium, sodium, potassium, ammonium, nitrates, and should not show more than traces of chlorides.

Magnesium sulphate is a saline purgative, its hydragogue cathartic action when taken by the mouth being entirely due to the property of hypertonic non-absorbable solutions in withdrawing fluid by osmosis from the surrounding tissues. The magnesium ion is absorbed hardly at all, and the sulphate ion also is excreted almost entirely by the rectum; magnesium sulphate is therefore one of the most powerful of the saline purgatives, its positive and negative ions both contributing to this result. It produces no irritation; the increased peristalsis results from distention due to the presence of an increased quantity of fluid. Strong solutions are used in dropsy and in inflammatory and congestive conditions to remove fluid and reduce blood pressure. In tropical dysentery, good results are obtained by giving 4 grammes of magnesium sulphate with a few minims of diluted sulphuric acid, in concentrated solution every two hours. With ferrous sulphate, it is given in anæmia, often with the addition of dilute sulphuric acid, which enhances its purgative action. It is the commonest domestic saline purgative in chronic constipation, and forms one of the chief ingredients of natural aperient mineral waters. Magnesium sulphate is usually given in solution or as *Magnesii Sulphas Effervescens*. *Mistura Alba* is a popular form of administration; it contains magnesium sulphate and carbonate, and is flavoured with peppermint water. Dilute solutions are given in lead poisoning to form the relatively insoluble

lead sulphate. Magnesium sulphate is incompatible with alkali carbonates and bicarbonates.

*Dose*.—2 to 8 grammes (30 to 120 grains) for repeated administration; for a single administration, 8 to 15 grammes ( $\frac{1}{4}$  to  $\frac{1}{2}$  ounce).

*NOTES*.—Solution of magnesium sulphate is prepared by dissolving 10 of magnesium sulphate in sufficient distilled water to produce 100 by volume, and filtering. Solution of magnesium ammonio-sulphate is prepared by dissolving 10 of magnesium sulphate and 20 of ammonium chloride in 80 of distilled water, then adding 42 of solution of ammonia, setting the mixture aside for a few days, decanting, and filtering.

## MAGNESII SULPHAS EFFERVESCENS.

EFFERVESCENT MAGNESIUM SULPHATE.

*Synonym*.—Effervescent Epsom Salt.

Magnesium Sulphate, in crystals	...	...	50.00
Sodium Bicarbonate, in powder	...	...	36.00
Tartaric Acid, in powder	...	...	19.00
Citric Acid, in powder	...	...	12.50
Refined Sugar, in powder	...	...	10.50

Powder the magnesium sulphate, previously dried at a temperature of about  $54.4^{\circ}$ , until it has lost 23 per cent. of its weight; mix it with the sugar, add the remaining ingredients, and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The resulting product should weigh about 100.

*Dose*.—4 to 16 grammes (60 to 240 grains), for repeated administration; for a single dose, 15 to 30 grammes ( $\frac{1}{2}$  to 1 ounce).

*NOTE*.—*Magnesii Sulphas Effervescens*, U.S.P., is prepared with 50 of magnesium sulphate, 40.3 of dried sodium bicarbonate, 21.1 of dried tartaric acid, and 13.6 of citric acid.

## MAIDIS STIGMATA.

MAIZE STIGMAS.

*Synonym*.—*Zea*; Corn Silk.

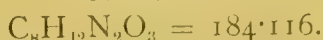
Maize stigmas are obtained from *Zea Mays*, Linn. (N.O. Gramineæ), the stigmas and styles being collected, and used fresh or dried.

The drug occurs as a loose, filamentous, tangled mass of slender, yellowish or brownish filaments, from 5 to 15 centimetres long. It is nearly inodorous, but has a faintly sweetish taste with a characteristic flavour.

The chief constituents of the drug are resin and maizenic acid, the latter a crystalline substance, soluble in water, alcohol, or ether. The stigmas also contain fixed oil, sugar, gum, and an odorous principle, as yet unidentified. The ash of the drug amounts to about 12 per cent.

Maize stigmas are diuretic and mildly anodyne. The drug is used for the alleviation of strangury, vesical pain, and other symptoms of the urinary tract, especially those due to phosphatic and uric acid gravel. An infusion (1 in 10) may be given in wineglassful doses several times a day, and a liquid extract is also used (see *Extractum Maidis Stigmatum Liquidum*).



**MALOUREA.****MALOUREA.**

*Synonyms.*—Diethyl-malonyl Urea ; Diethyl-barbituric Acid.

Malourea,  $(\text{C}_2\text{H}_5)_2\text{C}(\text{COHN})_2\text{CO}$ , is prepared by the condensation of urea with the diethyl ester of malonic acid.

It occurs in the form of colourless crystals, or as a white, crystalline powder. It is odourless, and has a faintly bitter taste. Soluble in water (1 in 160), more soluble in hot water (about 1 in 12); in alcohol (1 in  $8\frac{1}{2}$ ); easily soluble in ether, acetone, acetic ether, warm alcohol; difficultly soluble in chloroform, acetic acid, benzin, and amylic alcohol. Melting-point,  $191^\circ$ ; sublimes without residue. A saturated solution, acidified with nitric acid, gives with Millon's reagent a white gelatinous precipitate, soluble in excess of the reagent. It is soluble in alkalies, with which it forms very soluble salts. On melting with caustic alkali it evolves ammonia.

Malourea is a hypnotic which is said to act only upon the central nervous system, and has been found especially suitable for use in insomnia associated with cardiac disease, inducing sound sleep without subsequent depression. It is best given in cachets, swallowed with a draught of hot liquid, or it may be given in milk.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

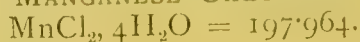
*NOTES.*—Malourea is also known under the trade-names Malonal and Veronal. Homalourea or dipropyl-barbituric acid (Proponal) is a homologue of malourea and possesses similar properties; it is readily dissolved by alkalies and acts more rapidly in some instances than malourea. Dose, 1 to 5 decigrams (2 to 8 grains), in a cachet, or dissolved in an alkaline liquid.

**MALTUM.****MALT.**

Malt consists of the grain of barley, *Hordeum distichon*, Linn. (N.O. Gramineæ), partially germinated and dried.

It occurs in yellowish or brownish grains, with an agreeable, characteristic odour, and sweet taste. They should float on water, break with a crisp fracture, and show a whitish interior.

The water-soluble portion of dried malt (about 70 per cent.) consists chiefly of dextrin and maltose, with some albumin and phosphates.

**MANGANI CHLORIDUM.****MANGANESE CHLORIDE.**

*Synonym.*—Manganesii Chloridum.

Manganese chloride,  $\text{MnCl}_2, 4\text{H}_2\text{O}$ , is obtained in large quantities as a by-product in the manufacture of chlorine, the acid liquor being evaporated to get rid of acid, the residue dissolved in water, and manganese carbonate added to throw out the iron. On filtration and evaporation manganese chloride is obtained in crystalline form. If

calcium chloride be present it is got rid of by recrystallisation. Or it may be prepared by dissolving pure manganese carbonate in pure hydrochloric acid, filtering the solution, concentrating and crystallising.

It occurs in the form of tabular crystals or as a granular powder, very hygroscopic, having a pale rose-red colour and a bitter, sharp, styptic taste, afterwards saline. Soluble in water (about 1 in 1); soluble in alcohol; insoluble in ether. The diluted aqueous solution is almost colourless, the concentrated solution pale red, and the alcoholic solution greenish. The latter burns with a red flame. On evaporation of the alcoholic solution colourless crystals are deposited containing 42.2 per cent. of alcohol, corresponding to the formula  $\text{MnCl}_2, 2\text{C}_2\text{H}_6\text{O}$ . The salt loses all its water of crystallisation at  $100^\circ$ . The anhydrous salt dissolves in water with elevation of temperature; melts, in absence of air, at a red heat, and sublimes at a higher temperature. Heated in contact with air it loses hydrochloric acid and yields an oxychloride.

This compound has the general properties of manganese salts (see Mangani Peroxidum Precipitatum), but is rarely used in medicine.

*Dose.*— $1\frac{1}{2}$  to  $7\frac{1}{2}$  decigrams (2 to 10 grains).

### MANGANI GLYCEROPHOSPHAS.

MANGANESE GLYCEROPHOSPHATE.



*Synonym.*—Manganesii Glycerophosphas.

Manganese glycerophosphate,  $\text{MnPO}_3, \text{O}, \text{C}_3\text{H}_5(\text{OH})_2$ , may be prepared by neutralising glycerophosphoric acid with manganese carbonate, and filtering. From the filtrate the manganese salt is precipitated by alcohol, and finally dried over sulphuric acid.

It occurs as a white or yellowish-white amorphous powder. Soluble in water. It responds to the characteristic reactions of the glycerophosphates generally, such as immediate precipitation with ammonium molybdate, precipitation with silver nitrate, the precipitate being soluble in excess of water, and formation of a white precipitate with lead acetate, the precipitate being soluble in acetic acid.

This compound has the general properties of the glycerophosphates, and is given with, or in place of, iron glycerophosphate. It is best dispensed in cachets, or made into pills with syrup of glucose.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### MANGANI HYPOPHOSPHIS.

MANGANESE HYPOPHOSPHITE.



*Synonym.*—Manganesii Hypophosphis.

Manganese hypophosphite,  $\text{Mn}(\text{PH}_2\text{O}_3)_2, \text{H}_2\text{O}$ , may be prepared by dissolving manganese carbonate in the equivalent quantity of

hypophosphorous acid and crystallising from the hot aqueous solution; or by boiling a solution of barium hypophosphite with a solution of manganese sulphate, filtering and evaporating, or allowing to crystallise. It should contain not less than 97 per cent. of pure manganous hypophosphite.

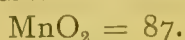
It occurs in white or slightly rose-coloured crystals or granular powder, odourless and nearly tasteless. Soluble in water (1 in 7); in boiling water (1 in 6); almost insoluble in alcohol. The aqueous solution is neutral to litmus paper. On heating the salt swells and evolves spontaneously inflammable phosphoretted hydrogen, and finally leaves a residue of manganese pyrophosphate. It is readily oxidised by nitric acid and reduces an acidulated solution of mercuric chloride to metallic mercury. It should be free from barium, arsenium, carbonates and phosphates, and contain only traces of calcium.

This compound has the general properties of the hypophosphites, and is used as a general "tonic" with the hypophosphites of lime and iron. It may be given in syrupy solution or enclosed in a cachet.

*Dose.*— $\frac{1}{2}$  to 4 decigrams (1 to 6 grains).

## MANGANI PEROXIDUM.

MANGANESE PEROXIDE.



*Synonyms.*—Manganesii Peroxidum; Manganese Dioxide; Black Oxide of Manganese.

Manganese peroxide,  $\text{MnO}_2$ , is found in nature chiefly in the form of pyrolusite, steel-grey, prismatic crystals having specific gravity 4.9, and also in the amorphous form, psilomelane. In this state it contains more or less iron oxide, calcium carbonate, and earthy matter. It may be obtained in a pure state by dissolving pure manganese carbonate in a small quantity of diluted nitric acid, evaporating the solution to a syrupy consistence, heating for some hours at  $160^\circ$  to  $165^\circ$ , thoroughly washing the product with boiling water, drying over sulphuric acid, and finally heating to a temperature of about  $200^\circ$ , until moisture is completely driven off.

It occurs, when prepared as above, as a hard, heavy, black or brownish-black powder, without taste or odour. Specific gravity, 5.02. Insoluble in water and in alcohol, but dissolving in acids with the formation of salts. Strong hydrochloric acid dissolves it, forming a brown solution. If this solution be heated chlorine is evolved, and a colourless solution of manganese chloride remains. Heated in a current of hydrogen it is reduced to  $\text{MnO}$ , not to the metallic state like iron; heated with potassium chlorate oxygen is evolved; with hydrogen peroxide oxygen is evolved, and the same quantity of manganese dioxide as originally used remains. Only half its oxygen is available for oxidising purposes. On heating strongly in a test-tube there should be no combustion, nor should any carbon dioxide be evolved (absence of organic impurity). It should



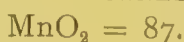
be free from antimony and sulphides. The native peroxide should contain at least 66 per cent. of manganese dioxide.

Manganese peroxide is employed to liberate chlorine from hydrochloric acid and sodium chloride, and for the preparation of potassium permanganate.

NOTE.—When manganese peroxide is ordered in prescriptions, the precipitated compound should be used.

## MANGANI PEROXIDUM PRÆCIPITATUM.

PRECIPITATED MANGANESE PEROXIDE.



*Synonyms.*—Manganesii Peroxidum Præcipitatum; Mangani Dioxidum Præcipitatum; Precipitated Manganese Dioxide.

Precipitated manganese peroxide,  $\text{MnO}_2$ , consists chiefly of manganese dioxide, with small amounts of other oxides of manganese, and may be prepared by the following process:—Dissolve 5 of manganese sulphate in 100 of distilled water; then dilute 25 of solution of ammonia and 25 of solution of hydrogen peroxide each with an equal volume of distilled water, mix, pour the mixed solutions slowly, with constant stirring, into the solution of manganese sulphate, and allow to stand for one hour, stirring frequently. The precipitate formed is repeatedly washed by decantation, collected on a filter, and the washing continued until free from alkaline reaction and sulphates. It is then drained, and dried at  $150^\circ$ . The product should contain at least 80 per cent. of manganese dioxide.

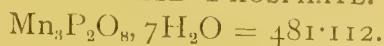
It occurs as a very fine, heavy, black powder, odourless, tasteless, and free from grittiness. Insoluble in water and in alcohol, soluble in hot mineral acids, entirely soluble in cold hydrochloric acid. The description of manganese peroxide applies generally to this preparation. If 1 gramme of the peroxide be digested with a mixture of 2 grammes of oxalic acid, 20 mls water, and 3 mls sulphuric acid, for several hours on a water-bath, it should be completely dissolved.

Preparations of manganese have been recommended for use as hæmatinics with or in place of iron, in anæmia and chlorosis, but they are by many authorities considered useless for this purpose. The peroxide is also employed in gastrodynia and pyrosis, being said to act in the same way as bismuth. It should be given in cachets, or in pills, massed with syrup. For the administration of manganese in liquid form, Liquor Ferri Peptonati cum Mangano is suitable.

*Dose.*—1 to 5 decigrammes (2 to 8 grains).

## MANGANI PHOSPHAS.

MANGANESE PHOSPHATE.



*Synonym.*—Manganesii Phosphas.

Manganese phosphate,  $\text{Mn}_3\text{P}_2\text{O}_8, 7\text{H}_2\text{O}$ , may be prepared by

precipitating a solution of manganese sulphate with sodium phosphate, and drying the precipitated salt without the aid of heat.

It occurs as a whitish powder, generally with a pinkish tint. Insoluble in water but soluble in hydrochloric acid.

Manganese phosphate possesses similar properties to ferrous phosphate, and has been used with or in place of that compound in preparing syrups.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### MANGANI SULPHAS.

MANGANESE SULPHATE.



*Synonym.*—Manganesii Sulphas.

Manganese sulphate,  $\text{MnSO}_4, 4\text{H}_2\text{O}$ , may be prepared by heating manganese peroxide with sulphuric acid, treating the resulting solution with manganese carbonate to precipitate any iron present, then filtering, evaporating, and crystallising. The product should contain about 99.5 per cent. of pure manganous sulphate.

It occurs in colourless or pale rose-coloured crystals or as a nearly white powder, with a slightly bitter and astringent taste. Soluble in water (1 in  $1\frac{1}{2}$ ), but insoluble in alcohol. The aqueous solution is neutral, or very slightly acid to litmus paper, and yields the usual reactions of manganese salts.

Manganese sulphate possesses purgative properties, but is uncertain in its action and tends to cause sickness. It has been used for jaundice.

*Dose.*—1 to 5 decigrams (2 to 8 grains).

### MANNA.

MANNA.

*Synonym.*—Flake Manna.

Manna is the dried saccharine juice exuded from the stems of *Fraxinus Ornus*, Linn., and *F. rotundifolia* (N.O. Oleaceæ), small trees cultivated for the purpose in Sicily. When the trees are about ten years old, a vertical series of oblique incisions is made; the juice which slowly exudes either dries on the stem (flake manna) or, in wet seasons, it drops from the stem and is caught upon tiles or cactus leaves, yielding inferior qualities in the latter case.

Flake manna, which is the best variety, occurs in yellowish-white, brittle, stalactitic masses about 10 to 15 centimetres long, and 2 to 2.5 centimetres wide. They are more or less evidently triangular in section, the side by which they adhered to the tree being smoother than the others, and slightly concave. They are indistinctly crystalline in structure, have a slight, agreeable odour, and sweet taste. Inferior qualities (small or broken manna) consist of fragments agglutinated together, and are often darker in colour and more glutinous than flake manna,

The chief constituent of manna is the hexahydric alcohol mannite,  $C_6H_8(OH)_6$ , of which it may contain as much as 80 per cent. Other constituents are mannotetrose (12 to 16 per cent.), manninotriose (6 to 16 per cent.), dextrose, lævulose, water (about 10 per cent.), traces of a fluorescent substance (fraxin), etc. Mannite can be isolated from manna by extracting with hot alcohol, cooling, and re-crystallising the crystals that separate. Melting-point,  $165^{\circ}$  to  $166^{\circ}$ ; specific gravity, 1.489; soluble in 6.5 of water at  $16^{\circ}$ ; easily soluble in hot alcohol, sparingly in cold. Optically inactive. Mannotetrose is dextro-rotatory, and yields on hydrolysis two molecules of galactose and one each of dextrose and lævulose; manninotriose is apparently a product of the spontaneous hydrolysis of mannotetrose.

Manna is employed as a gentle laxative for infants and children. For the former, a piece about the size of a hazel-nut is dissolved in a little warm water and added to the food. To children, 2 or 4 grammes may be given dissolved in warm milk, or a mixture may be prepared with syrup or syrup of senna and dill water. Syrups of manna are prepared, with and without other purgatives. Manna is sometimes used as a pill excipient, especially for calomel.

*Dose.*—60 to 240 grains (4 to 16 grammes).

NOTES.—The term manna is extremely old, and is applied to the saccharine exudation of a number of plants, *e.g.*, *Quercus vallonca*, Kotschy, and *Q. persica*, Jaub. et Spach. (oak manna), *Alhagi maurorum*, DC. (alhagi manna), *Tamarix gallica*, var. *mannifera*, Ehrenb. (tamarisk manna), *Larix Europæa*, DC. (Briançon manna), etc. None of these, however, has any commercial importance.

## MARRUBIUM.

### HOREHOUND.

Horehound consists of the dried leaves and flowering tops of the white horehound, *Marrubium vulgare*, Linn. (N.O. Labiatae), an erect herbaceous plant indigenous to Britain and widely distributed over Europe. It is collected chiefly in the South of France, and dried.

The plant has a quadrangular, branching stem, covered with dense, whitish, woolly hairs. Leaves opposite, petiolate, about 3 to 5 centimetres long, rounded ovate, or ovate-acuminate, with dentate-crenate margin, wrinkled, densely woolly on the under surface. Flowers in verticillasters in the axils of the upper leaves; calyx hairy, and provided with ten recurved, hooked teeth; corolla bilabiate, whitish upper lip, small, erect, and cleft. The drug has an agreeable odour, and somewhat aromatic, bitter taste.

It contains a crystalline bitter principle, marrubiin, together with a little volatile oil and tannin. Marrubiin crystallises in colourless plates or needles, melting at  $160^{\circ}$ ; it is almost insoluble in water, but soluble in alcohol and in ether.

Horehound is an expectorant, and laxative in large doses. It is a popular domestic remedy for coughs, colds, and pulmonary affections in the form of infusion (1 in 20) and syrup. It is said to be of



especial use when the expectoration is excessive. Horehound candy is similarly employed.

*Dose*.—1 to 2 grammes (15 to 30 grains).

NOTE.—White horehound is sharply characterised by the dense, woolly hairs, and ten hooked calyx teeth. Other species have occasionally been substituted for it. *M. peregrinum*, Linn., has ten straight calyx teeth; *M. candidissimum* has five nearly straight calyx teeth, and is less bitter and less aromatic. Black horehound, *Ballota nigra*, L., has dark green leaves, with rough, not woolly, hairs, and has a disagreeable odour.

### MASSA KAOLINI.

#### KAOLIN MASS.

*Synonyms*.—Unguentum Kaolini; Kaolin Ointment.

Kaolin	...	...	...	...	25·00
Soft Paraffin, white	...	...	...	...	50·00
Hard Paraffin	...	...	...	...	25·00

Melt together the hard and soft paraffins, add the kaolin, and stir till cold.

Kaolin mass is employed in the preparation of pill masses, containing substances that are readily reduced by contact with the organic matter of the usual pill excipients—*e.g.*, potassium permanganate, silver nitrate and oxide, and gold chloride.

### MASSA PARAFFINI.

#### PARAFFIN MASS.

Hard Paraffin	...	...	...	...	40·00
Soft Paraffin, white	...	...	...	...	60·00

Melt together the hard and soft paraffins.

This mass is used as a pill excipient for silver nitrate or oxide, potassium permanganate, gold chloride, etc. (see also Massa Kaolini).

### MASTICHE.

#### MASTIC.

Mastic is a resinous exudation from *Pistacia Lentiscus*, Linn. (N.O. Anacardiaceæ), a small tree indigenous to the Mediterranean countries. It is collected on the island of Scio (Chios), in the Grecian Archipelago, by puncturing the bark of the trees and allowing the oleoresin, which is contained in schizogenous ducts in the bast, to exude and harden.

It occurs in small, hard, pyriform or nearly globular tears about 5 millimetres long. When fresh they are pale yellow in colour, clear, and glassy, but on keeping the surface becomes dull and dusty. It has a somewhat aromatic odour and agreeable taste, breaking up when chewed into sandy fragments which agglomerate into a plastic mass. Insoluble in water, partly soluble in alcohol or oil of turpentine, very soluble in chloroform (2 in 1), and in ether (2 in 1). The acid number of mastic varies from 45 to 67.

according to the method adopted in its determination; specific gravity, 1.074; melting-point, about 106°.

The chief constituent of mastic is resin, which is associated with about 2 per cent. of volatile oil. The resin has been separated into the following constituents:  $\alpha$ - and  $\beta$ -masticinic acid (together about 4 per cent. of the drug), masticolic acid (crystalline, traces),  $\alpha$ - and  $\beta$ -masticonic acid (amorphous, about 38 per cent.),  $\alpha$ -mastico-resene (soluble in alcohol, about 30 per cent.),  $\beta$ -mastico-resene (also-called masticin, insoluble in alcohol, about 20 per cent.). The volatile oil consists chiefly of d-pinene.

Mastic is used in Eastern countries as a masticatory to sweeten the breath and preserve the teeth and gums. It was formerly much employed internally as a stimulant to the mucous membranes in place of other terebinthinate resins, but is now rarely used. Solutions of mastic in alcohol, ether, or chloroform are used applied on cotton wool as temporary stoppings for carious teeth (see *Mastiche et Chloroformum*).

*Dose*.—1 to 3 grammes (15 to 45 grains).

*NOTES*.—East Indian or Bombay mastic is obtained from *P. khinjuk*, Stokes (and possibly other species); it somewhat resembles genuine mastic, but the tears are darker, less vitreous, and not so clean. It is also more soluble in alcohol, less soluble in oil of turpentine, and less disposed to agglomerate when chewed; the acid number varies from 103 to 109.

## MASTICHE ET CHLOROFORMUM.

### MASTIC AND CHLOROFORM.

*Synonyms*.—*Mastiche cum Chloroformo*; *Chloroformum Mastichis*.

Mastic	...	...	...	...	...	65.00
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Chloroform, sufficient to produce	...	...	100.00
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Dissolve the mastic in the chloroform, allow the solution to stand till clear, and decant the clear liquid.

This solution is applied on cotton wool as a temporary stopping for decayed teeth; the cavity should be previously cleansed and well dried.

*NOTES*.—Mastic Dentaire is a preparation similar to the above, but made with ether in place of chloroform. Alcohol Mastichi (Harvard Liquid) is prepared by digesting 2 of mastic with 1 of alcohol; it is used in dental operations for coating temporary coverings of cotton wool.

## MATÉ FOLIA.

### MATÉ.

*Synonym*.—Paraguay Tea.

Maté consists of the dried leaves of *Ilex paraguayensis*, Hook., and other species (N.O. Ilicineæ), shrubs indigenous to Brazil and the Argentine Republic. After collection they are dried by artificial heat and reduced to coarse powder, which is packed in hide serons or in sacks for transportation.

The leaves are ovate or oblong-lanceolate in shape, 5 to 15 centimetres long, with distantly crenate-serrate margin; coriaceous, pale or dark green and nearly glabrous; lateral veins depressed on the upper surface. Odour aromatic, taste bitterish astringent, and

somewhat empyreumatic. As the commercial drug is always in coarse powder the following structural characters aid in its identification:—Upper epidermis of small polygonal cells with thick striated cuticle; stomata, on under surface only, very numerous, each surrounded by four or five cells; numerous prismatic and cluster crystals of calcium oxalate, particularly in the cortex of the midrib, which is provided with a sheath of pericyclic fibres.

The chief constituents of maté are 0·2 to 1·6 per cent. of caffeine, and from 10 to 16 per cent. of tannin.

Maté is largely used in South America, in the form of infusion, as a refreshing drink.

## MATICO.

### MATICO.

Matico consists of the dried leaves of *Piper angustifolium*, Ruiz and Pav. (N.O. Piperacæ), a shrub growing in Bolivia, Peru, Brazil, and Colombia.

The leaves are from 10 to 15 centimetres long, 2 to 4 centimetres wide, lanceolate and acuminate in outline, cordate and unequal at the base, and very shortly petiolate. The upper surface is tessellated by the depressed veinlets, which divide it into squares about 1 to 2 millimetres wide. On the under surface the veinlets are raised, and the depressions thus formed are clothed with shaggy hairs. The flowering or fruiting spikes which are occasionally found in the drug are 10 to 15 centimetres long, and very slender. Matico leaves have a slight aromatic odour, and bitter camphoraceous taste. The drug is usually imported in dusky green, compressed brittle masses.

The chief constituents of matico are volatile oil, tannin, resin, and crystallisable artanthic acid.

Matico is employed as an aromatic astringent in inflammatory conditions of the urinary passages, especially in cystitis, gonorrhœa, leucorrhœa, and catarrh of the bladder in aged people. The infusion, liquid extract, and tincture are used internally in mixture form. The latter is the more powerful styptic and may be applied to leech-bites and small wounds to arrest hæmorrhage. It has also been recommended for use in hæmoptysis, hæmatemesis, and hæmaturia, but it is valueless (see Acidum Tannicum).

*Dose in powder.*—2 to 8 grammes (50 to 120 grains).

NOTES.—Much of the matico leaves at present imported differs from the leaves described in being longer (20 centimetres), broader, and less acuminate. The transverse section, however, shows a structure similar to that of the genuine leaves, in particular a single row of colourless hypodermal cells; they are probably derived from a variety of *P. angustifolium*. Very similar leaves have also been observed in commerce, but destitute of the hypoderma, and probably derived from a distinct species. The leaves of *P. aduncum*, Linn., are marked on the under-surface by more prominent ascending parallel veins, the spaces between which are comparatively smooth and nearly glabrous. The differences recently found in matico oil are to be ascribed to similar variation in the drug from which it has been distilled. Formerly the leaves yielded 1 to 3·5 per cent. of an oil of specific



gravity 0·93 to 0·99, and containing a crystallisable matico camphor and asarone. Latterly the leaves have yielded 3 to 6 per cent. of an oil of specific gravity 1·06 to 1·13, free from matico camphor and asarone, but containing dill apiol and parsley apiol.

## MEDULLA RUBRA.

RED BONE MARROW.

*Synonym.*—Veal Marrow.

Red bone marrow is obtained from the bones of young calves. It is the connective tissue which occupies the spaces in the spongy or cancellous tissue, and is highly vascular.

It occurs as a reddish mass, which contains a few fat cells and a large number of amœboid marrow cells, resembling large leucocytes. Among the cells are some nucleated cells of the same tint as coloured blood corpuscles; these are known as erythroblasts, and from them the coloured corpuscles of the blood are developed. Yellow marrow, which is alone found in the bones of older animals, fills the medullary cavity of long bones, and consists chiefly of fat cells, with numerous blood vessels. Palmitic, stearic, and oleic acids have been obtained from marrow fat.

Red bone marrow is the only kind that should be used in medicine. It has been employed in the treatment of pernicious anæmia, chlorosis, and hæmoglobinuria, being given alone in the fresh state or in the form of *Extractum Medullæ Rubræ*; the carefully desiccated marrow is also administered in capsules or tablets.

*Dose.*—12 to 24 decigrams (20 to 40 grains) of the fresh marrow, or 3 to 6 decigrams (5 to 10 grains) of the dried substance.

## MEL.

HONEY.

Honey is a saccharine secretion deposited in the honeycomb of the bee, *Apis mellifica*, Linn. (Order Hymenoptera), the saccharine matter being extracted from the nectaries of flowers by the bee, the intestine of which contains invertin, a substance which converts cane sugar into the invert sugar found in honey. The finest, or "virgin" honey, is obtained from hives which have never swarmed, but most of the honey of commerce is obtained by submitting the honeycomb to pressure, with or without the application of heat, or by extraction with a centrifuge.

It occurs as a viscid, translucent, syrupy liquid, or soft, opaque and crystalline semi-solid, and varies in colour from white or pale yellowish to yellowish-brown or reddish-brown. Soluble in water. It has a characteristic aromatic odour, and a sweet, faintly acrid taste.

The chief constituents of honey are about 70 to 81 per cent. of dextrose and lævulose; other constituents are dextrin, wax, proteids, volatile oil, formic acid, colouring matter, mucilage, and water,

while pollen, spores, and other flocculent matters are usually also present in suspension, and tend to induce fermentation.

Honey is used chiefly in the form of *Mel Depuratum*.

*Dose*.—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

### MEL BORACIS.

BORAX HONEY.

*Synonym*.—Borax and Honey.

Borax, in fine powder ... ..	10.50
Glycerin, by weight ... ..	5.25
Clarified Honey, by weight ... ..	84.00

Mix the borax with the glycerin, and add the honey gradually.

Borax honey is used as a cleansing application to the tongue and buccal mucous membrane in aphthous ulceration. It is acid in reaction and effervesces with sodium bicarbonate.

### MEL DEPURATUM.

CLARIFIED HONEY.

*Synonym*.—Mel Despumatum.

Clarified honey is prepared by melting honey on a water-bath, and straining through new flannel previously moistened with hot water.

It occurs as a viscid, translucent liquid of a light yellowish or brownish-yellow colour, gradually becoming stiff and opaque owing to crystallisation of the grape sugar or dextrose. Specific gravity, about 1.4. It has a pleasant, characteristic odour, and a very sweet, faintly acid taste. The slight acidity is due to the presence of a minute quantity of formic acid, which acts as a preservative. If the honey is impure it is liable to fermentation in warm weather, the taste becoming pungent and the colour deeper. Soluble readily in water, and in diluted alcohol. The aqueous solution has a faintly acid reaction to litmus, and is lævogyrate, occasionally dextrogyrate, according to the nature of the food on which the bees have been fed. On incineration clarified honey should not yield more than 0.25 per cent. of ash. A higher percentage would indicate the presence of foreign inorganic substances, or adulteration with molasses, commercial glucose, etc. On the other hand an exceptionally low percentage of ash might indicate adulteration with pure glucose. The ash should not contain more than traces of sulphates or chlorides. On boiling with water and cooling, there should be no blue or violet colouration on the addition of solution of iodine (absence of starch). If absolute alcohol be carefully poured on to a 20 per cent. solution of the honey, there should be no permanent milky zone formed at the point of contact of the two liquids (absence of starch sugar). On pouring a 20 per cent. solution carefully on to pure sulphuric acid, there should be no immediate colouration at the point of contact,

and at the end of one hour not more than a yellowish or clear brown zone (absence of cane sugar).

This is a convenient form of honey for use in liquid preparations as a demulcent and sweetening agent. It is employed in cough mixtures with expectorants and sedatives, and is a convenient vehicle for the application of borax to the mouth in aphthous conditions (see *Mel Boracis*). It is used in the preparation of *Oxymel* and to prepare confections.

*Dose*.—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

### MEL ROSÆ.

#### HONEY OF ROSE.

Liquid Extract of Rose Petals	...	...	12·00
Clarified Honey, sufficient to produce by weight			100·00

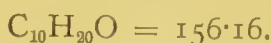
Mix the extract thoroughly with the honey.

Honey of rose is used to flavour demulcent cough mixtures, gargles, and the like.

*Dose*.—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

### MENTHOL.

#### MENTHOL.



Menthol,  $\text{C}_6\text{H}_9\text{OHCH}_2\text{C}_3\text{H}_7$ , is a saturated secondary alcohol, found only in the *lævogyrate* modification, as the principal constituent of peppermint oils obtained from various species of *Mentha*, and imported into England chiefly from Japan. The oils from which it is chiefly obtained are those from *Mentha arvensis*, var. *piperascens*, in Japan; var. *glabrata*, in China; and *Mentha piperita*, in America. It is separated from the oils by freezing.

It occurs in colourless, acicular or prismatic crystals belonging to the hexagonal system, more or less moist from adhering oil; brittle, and having a strong odour of peppermint, and a warm aromatic taste followed by a sensation of cold on drawing air into the mouth. Almost insoluble in water and in glycerin; soluble in alcohol (5 in 1), in ether (8 in 3), in chloroform (about 4 in 1), in petroleum spirit (10 in 7), in olive oil (1 in 4), in ethereal oils, etc. Melting-point,  $43^\circ$ , at which temperature it is a colourless liquid; boiling-point,  $212^\circ$ ; specific gravity, about 0·890. Water with which it has been shaken acquires the characteristic odour and taste. Alcoholic and other solutions are neutral to litmus paper. It volatilises slowly at ordinary temperatures; heated in an open dish on a water-bath it volatilises without leaving any residue (absence of magnesium sulphate, wax, paraffin, etc.). In contact with thymol, camphor, etc., it liquefies. Boiled with sulphuric acid diluted with half its



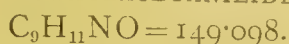
volume of water, menthol acquires an indigo-blue or ultramarine colour, the acid becoming brown (this test is considered as of extremely doubtful value). If a few crystals be dissolved in 1 mil of glacial acetic acid, and 3 drops of sulphuric acid and 1 drop of nitric acid be added, no green colour should be developed (absence of thymol). When menthol is oxidised with chromic acid mixture, the lævogyre ketone,  $C_{10}H_{18}O$  (menthone), is produced. Dehydrated by means of zinc chloride or potassium acid sulphate, menthol is converted into menthene ( $C_{10}H_{18}$ ). Heated with anhydrous copper sulphate to  $250^{\circ}$  to  $280^{\circ}$ , menthol yields cymene. A derivative by means of which menthol is easily characterised is the menthyl benzoate produced by heating it with benzoic anhydride. The ester melts at  $54.5^{\circ}$ , and is with difficulty volatilised with water vapour.

Menthol is used internally as a stimulant and carminative either in the form of pill, or dissolved in oil and enclosed in a gelatin capsule. It resembles oil of peppermint in its action, but is more powerful, and more liable to upset digestion. Pills are best prepared by adding a little soap and massing with syrup of glucose. If camphor, carbolic acid, or other liquefying substance is present, kieselguhr should be added as an absorbent, and the same process followed. Externally it is employed as a local analgesic. Rubbed on the skin it produces a sensation of cold, followed by numbness and partial anæsthesia; it first stimulates the nerves, conveying the sensation of cold, and later penetrates the skin and paralyses the terminations of the ordinary sensory nerves. Menthol moulded into cones is rubbed over neuralgic areas to allay pain. Its action is more complete when dissolved in chloroform, the solution being applied with a brush. Linimentum Mentholis is such a preparation and is used in neuralgia, sciatica, and lumbago. Menthol is readily absorbed from the skin when dissolved in oleic acid; a solution of menthol, 200 grains, in 4 fluid drachms of oleic acid is known as "Mentholeate," and is used in neuralgia, pruritus, etc. Menthol is much used as an inhalation or application to the nasopharyngeal and laryngeal mucous membranes. Mixed with camphor and oil of eucalyptus it is inhaled from cotton wool or with steam from hot water for the relief of catarrhs. It is a common ingredient of snuffs for use in nasal catarrh (see Insufflatio Mentholis), and is also much used in the form of pastille, and in oily solution (1 or 2 per cent.) applied by means of a spray. In this form menthol soothes the irritation of catarrh, arrests sneezing, and relieves the sense of fulness in the head. Strong alcoholic solutions of menthol are precipitated on the addition of water. When menthol is required in an aqueous medium, Aqua Mentholis, which is a saturated solution, should be used. Emplastrum Mentholis is applied in rheumatism and lumbago. Liquefying mixtures of equal weights of menthol and chloral or camphor are applied on cotton wool to carious teeth to relieve pain. A solution of menthol in olive oil (1 in 4) is used as a paint for the larynx in tuberculous ulceration.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

**METHYLACETANILIDUM.**

METHYLACETANILIDE.

*Synonym.*—Methyl-phenyl-acetamide.

Methylacetanilide,  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)\text{CH}_2\text{CO}$ , is a methyl derivative of acetanilide. It may be prepared by treating monomethylaniline with acetyl chloride. When the reaction is completed the acicular crystals, formed after cooling, are collected and recrystallised from boiling water or diluted alcohol.

It occurs in the form of long, acicular crystals, or tables, colourless, odourless, and having a slightly saline taste. Soluble in cold water (1 in 60), in boiling water (1 in 2), in chloroform (1 in 2), in ether (1 in 10); very easily soluble in alcohol, both strong and diluted. Dissolved in hot water to supersaturation, it forms a solution which when cold immediately solidifies on the addition of a minute crystal of the salt. Unlike most other supersaturated solutions, however, it will not solidify on agitating, or scratching the interior of, the containing vessel. Melting-point,  $101^\circ$ ; boiling-point, about  $245^\circ$ , without decomposition. It fuses under boiling water. By heating with sodium hydroxide or concentrated sulphuric acid it is decomposed into acetic acid and monomethylaniline. On boiling with hydrochloric acid and neutralising with ammonia no violet colour should be produced on the addition of chlorinated lime (absence of aniline), nor should any odour of isonitrile be detected when heated with alcoholic potash and chloroform (absence of acetanilide). One gramme of methylacetanilide is soluble in 2 mls of chloroform (distinction from acetanilide and phenacetin). It should be free from chlorides.

Methylacetanilide is employed chiefly as an analgesic in neuralgia, sciatica, migraine, and locomotor ataxy. Its action resembles that of acetanilide, but is more powerful. Large doses may cause severe toxic symptoms; 6 to 8 grains were formerly given, but the dose of 3 grains is now rarely exceeded. It is converted in the body into para-amido-phenol. It may be administered in the form of a draught by dissolving the methylacetanilide in a little weak alcohol or tincture and diluting with water. Pills may be prepared with glucose as an excipient, or it may be given in cachets. In case of poisoning by methylacetanilide, 2 grammes (30 grains) of salicylic acid—with which it is chemically incompatible—may be given, followed by hypodermic injections of atropine.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

NOTE.—Methylacetanilide is also known under the trade-name Exalgin.

**METHYLAMINA.**

METHYLAMINE.



Methylamine,  $\text{CH}_3\text{NH}_2$ , occurs naturally in the plant *Mercurialis annua*, and is formed during the decomposition of bone and many

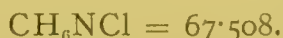
other organic substances, *e.g.*, alkaloids. It may be prepared by treating a mixture of acetamide and bromine with a 10 per cent. solution of potassium hydroxide until nearly decolourised, running the solution thus obtained slowly into a 30 per cent. solution of potassium hydroxide heated to 60° to 70°, and digesting for ten to fifteen minutes till decolorised. The solution is then boiled, the gas evolved is passed into diluted hydrochloric acid, and the methylamine again separated by distillation with quicklime.

It is a colourless, inflammable gas, burning with a vivid yellow flame, and is converted into a very mobile, colourless liquid at several degrees below zero. It is more strongly basic and even more soluble in water than ammonia. The liquid boils at -6°. It has a strong ammoniacal odour. It is the most soluble of all the gases, one volume of water dissolving 1150 volumes of methylamine. The aqueous solution gives off the gas on heating. In most of its reactions with metallic salts it resembles ammonia, but dissolves aluminium hydroxide, and does not dissolve the hydroxides of cadmium, nickel, and cobalt. Its behaviour towards acids and platinic chloride is similar to that of ammonia. Potassium converts it into potassium cyanide. It precipitates lead nitrate, but not lead acetate. With mercurous nitrate it gives a black precipitate, and with mercuric chloride a white precipitate. Nessler's reagent produces a light yellow precipitate, insoluble in excess of the reagent or in water, and affords a very sensitive reaction. The precipitate readily blackens on exposure to light. In contact with hydrochloric acid vapour it gives off dense fumes.

Methylamine is employed chiefly for technical purposes, in the form of a 33 per cent. aqueous solution.

## METHYLAMINÆ HYDROCHLORIDUM.

### METHYLAMINE HYDROCHLORIDE.



Methylamine hydrochloride,  $\text{CH}_3\text{NH}_2\text{HCl}$ , is prepared by neutralising an aqueous solution of methylamine with hydrochloric acid, and evaporating to dryness. The residue dissolves readily in boiling alcohol, which, on cooling, deposits the salt in crystals. These crystals at the moment of their formation appear iridescent by reflected light.

It occurs in fine, large laminæ, colourless, and deliquescent. Very soluble in water and in alcohol; insoluble in chloroform. Its solubility in alcohol distinguishes it from ammonium chloride. Melting-point, 222°. Heated in an open vessel to a high temperature, it volatilises in dense vapours, which condense to a white powder on cold surfaces. It forms with many metallic chlorides well-crystallised double salts.

Methylamine hydrochloride is not used in medicine, but is employed for technical purposes.



**METHYLDITANNIN.**

METHYL-DITANNIN.

*Synonym.*—Methylene-ditannin.

Methyl-ditannin,  $\text{CH}_2(\text{C}_{14}\text{H}_9\text{O}_9)_2$ , is a condensation product of tannic acid and formaldehyde, and may be prepared by dissolving 5 of tannin in 15 of hot water, adding 3 of formic aldehyde solution (30 per cent.), and then precipitating completely with hydrochloric acid. The product is washed with water and dried at a moderate heat.

It occurs as a light, pinkish or reddish-white powder, odourless, and tasteless. Insoluble in water and acids, but soluble in alcohol and the usual organic solvents, also in solutions of ammonia with yellow colouration, in solutions of sodium and potassium hydroxides with reddish-brown colouration, and precipitated again from these solutions by acids. Melting-point,  $230^\circ$ , with decomposition. On dissolving 1 centigram in 2 mls of concentrated sulphuric acid, with a little heat, a brown colouration is produced, which, on further warming, passes to green and then blue. The green or blue solution gives with alcohol a magnificent blue colouration, changing after a time to wine-red; but, on the other hand, the addition of diluted solution of sodium hydroxide turns it grass-green in colour.

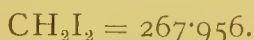
Methyl-ditannin is used as an antiseptic and non-irritating dusting-powder, either alone or diluted with talc or starch, 1 to 5 or 10.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

NOTE.—Methyl-ditannin is also known under the trade-name Tannoform.

**METHYLENI IODIDUM.**

METHYLENE IODIDE.

*Synonym.*—Diiodo-methane.

Methylene iodide,  $\text{CH}_2\text{I}_2$ , may be prepared by heating 4 of iodoform with 9 of sodium ethylate, dissolved in alcohol. On adding water to the product methylene iodide separates as an oily liquid, which is then washed with water and rectified over calcium chloride. It may also be prepared by heating iodoform or chloroform in a sealed tube with strong hydriodic acid at  $130^\circ$  for some hours.

It occurs as a yellowish, strongly refracting liquid, which becomes yellowish-red on keeping. It boils at  $180^\circ$ , and becomes partially decomposed. It solidifies at about  $0^\circ$  to a crystalline mass of brilliant laminæ, which melt at  $4^\circ$ . Specific gravity, 3.335. Soluble in alcohol and in ether. With potassium there is no action in the cold, but on heating it reacts with explosive violence. Heated with metallic copper and water it is decomposed into a number of compounds, chiefly cuprous iodide and a mixture of carbon dioxide, carbon monoxide, methane

and ethylene, but no methylene is formed. With chlorine it yields methylene chloride. Methylene iodide contains 94·8 per cent. of iodine.

Methylene iodide is the heaviest organic liquid at present known; it is used for determining the specific gravity of precious stones and other minerals.

### METHYLIS CHLORIDUM.

METHYL CHLORIDE.

$\text{CH}_3\text{Cl} = 50\cdot474$ .

*Synonyms.*—Chloro-methyl; Monochlor-methane.

Methyl chloride,  $\text{CH}_3\text{Cl}$ , may be prepared by the action of hydrochloric acid on methyl alcohol, with or without the addition of zinc chloride. On the commercial scale, however, it is prepared from trimethylamine, which occurs among the residual products in the manufacture of alcohol from the molasses of beet-root sugar. The trimethylamine when purified is converted into the chloride, and the compound decomposed at a temperature of about  $260^\circ$ , the products being methyl chloride, ammonia, and trimethylamine. These are conducted into vessels containing hydrochloric acid, whereby the ammonia and trimethylamine are fixed in the form of salts, while methyl chloride in gaseous form passes into a gas-holder, from which it is ultimately compressed, its liquefaction being easily effected under a pressure of about five or six atmospheres. In commerce it is found as a compressed liquid in copper cylinders, some of which are provided with a valve and a tube for producing a jet.

It occurs, in the compressed state, as a colourless liquid, having an ethereal odour, and a sweet taste. Soluble in water, much more so in alcohol, freely in ether and chloroform, and also in acetic acid. It should be neutral to test paper. At about  $-25^\circ$  it has a specific gravity of 0·991, and boils at about  $-21^\circ$ . It burns in air with a greenish flame, though it is not highly inflammable. The neutral solution is not precipitated by solution of silver nitrate, nor is there any reaction with potassium iodide and starch paste. In the liquid condition it is a powerful refrigerating agent. By its evaporation a temperature of  $-23^\circ$  is produced, whilst if evaporation be accelerated by means of a current of air a temperature of  $-55^\circ$  may easily be reached. On account of this property it is used as a local anæsthetic in the form of spray, but its use requires caution since it is apt to produce blisters. At very low temperatures it forms with water a hydrate,  $\text{CH}_3\text{Cl} \cdot 9\text{H}_2\text{O}$ . Its vapour is said to be non-poisonous.

Methyl chloride is used to produce local anæsthesia, the spray being directed obliquely upon the part, which may be partly protected by a thin layer of cotton wool. In neuralgia, sciatica, and lumbago, cotton wool soaked in liquid methyl chloride may be applied to the seat of pain. On account, however, of its action on the skin, pure methyl chloride is not much used as a local anæsthetic; a mixture

of methyl and ethyl chlorides, which is free from this disadvantage, is, therefore, employed. Methyl chloride is used as a general anæsthetic, mixed with ethyl chloride and ethyl bromide (see *Ethylis Chloridum*).

### METHYLIS SALICYLAS.

METHYL SALICYLATE.



*Synonym.*—Artificial Oil of Wintergreen or Sweet Birch.

Methyl salicylate,  $\text{C}_6\text{H}_4(\text{OH})\text{COOCH}_3$ , is the methyl ester of salicylic acid, and the principal constituent of oil of wintergreen and oil of sweet birch, existing in the former to the extent of about 99 per cent., and in the latter to about 99.8 per cent. Much of the oil of wintergreen of commerce, however, is the synthetic methyl salicylate, which is practically identical with the natural products. It may be prepared by dissolving 14 of salicylic acid in 60 of methyl alcohol, then gradually adding 30 of sulphuric acid, warming for about twenty-four hours, and distilling in a current of steam. The distillate is subsequently washed and separated.

It occurs as a colourless, or pale yellow, oily liquid with the strong, characteristic odour and aromatic, sweetish taste of wintergreen. Slightly soluble in water, soluble in all proportions of alcohol, ether, chloroform, glacial acetic acid, and carbon disulphide. Specific gravity, 1.183 to 1.188; boiling-point,  $219^\circ$  to  $221^\circ$ . Optically inactive. The aqueous solution is neutral or slightly acid to litmus, and yields with a trace of ferric chloride an intense violet colouration. It should form a perfectly clear solution with 5 parts of alcohol (70 per cent.) at  $20^\circ$ . On evaporating in a flask it should yield no fraction containing alcohol or chloroform. On adding 10 mils of solution of sodium hydroxide (5 per cent.) to 1 mil of the methyl salicylate in a large test-tube, and shaking, a copious white crystalline precipitate will be formed, which, on immersing the tube, loosely corked, in boiling water for about five minutes with occasional shaking, should completely dissolve to a clear, colourless, or faintly yellow solution without separation of oily drops on the surface or at the bottom of the liquid (absence of volatile oils or of petroleum). The alkaline liquid, on dilution with three volumes of water and addition of slight excess of hydrochloric acid, yields a white crystalline precipitate of salicylic acid, which, on washing and drying, should respond to the tests for the purified substance (absence of methyl benzoate, etc.).

Methyl salicylate is rapidly absorbed when rubbed on the skin, and this property allows the concentration of its action upon rheumatic and stiff joints and in lumbago; it may also be applied to the forearm or any convenient surface for the general action of the salicylates in acute and chronic rheumatism, pharyngitis and chorea, etc. (see *Sodii Salicylas*). In acute lumbago, massage with methyl salicylate acts almost immediately; and it has been shown that, in the



most inveterate cases of stiff back, such massage, applied at intervals for a month or two if necessary, will generally remove the condition. The pure substance may be painted on the skin and covered with oiled silk or gutta percha tissue, or it may be mixed with an equal quantity of olive oil and applied with gentle friction or on lint. It is recommended for local application in orchitis and mumps. An ointment of methyl salicylate with hydrous wool fat (1 in 8) is prepared for use in rheumatism and neuralgia, menthol (1 in 16) being sometimes added. Methyl salicylate is used internally in acute and chronic rheumatism enclosed in a gelatin capsule (5 or 10 minims in each). It may be emulsified with mucilage of acacia and given in mixture form, but its taste is pungent and objectionable. It is used as a flavouring agent and as an antiseptic in mouth washes, tooth pastes, and powders.

*Dose.*— $\frac{1}{2}$  to 1 mil (8 to 15 minims).

*NOTE.*—Methyl salicylate should be used for application to the skin rather than oil of wintergreen, as the latter frequently causes irritation and may give rise to a rubeoliform eruption.

## METHYLOSANILINUM.

METHYL-ROSANILINE.

*Synonym.*—Methyl Violet.

Methylrosaniline is a mixture of the hydrochlorides of penta- and hexa-methyl-para-rosanilines, formed by the oxidation of dimethyl aniline with cupric salts.

It occurs as a green mass with a metallic lustre, or as a green crystalline powder. Soluble in water (1 in 75) and in alcohol (1 in 20), the solution having a violet colour, and being decomposed by exposure to light. The colour becomes green in presence of acids.

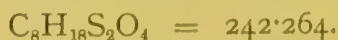
Methyl violet has been employed for the internal and local treatment of malignant tumours; also for cardiac dropsy, and as a local application in diphtheria. As a lotion, a 1 per cent. solution may be used, a weaker solution (1 in 500) being used as an injection. A dusting powder is prepared with 1 of methyl violet and 9 of boric acid; this is applied on cotton wool, or by means of a powder insufflator.

*Dose.*—6 to 12 milligrams ( $\frac{1}{10}$  to  $\frac{1}{5}$  grain).

*NOTE.*—Methyl violet is also known by the trade-name Pyoktanin.

## METHYLSULPHONALUM.

METHYLSULPHONAL.



*Synonyms.*—Diethylsulphone-methylethylmethane;  
Sulphonethylmethanum; Sulphon<sup>ethyl</sup>methane.

Methylsulphonal,  $(\text{CH}_3)(\text{C}_2\text{H}_5)\text{C}(\text{SO}_2\text{C}_2\text{H}_5)_2$ , is diethyl-sulphone methyl-ethyl-methane, a compound analogous in composition to sulphonal, differing only in the substitution of an ethyl for a methyl

group. It may be prepared in the same way as sulphonal, but using methyl-ethyl-ketone instead of acetone, and thus obtaining methyl-ethyl-ketone-mercaptol which, on oxidation with potassium permanganate, yields methylsulphonal. It may be purified by repeated crystallisation from boiling water.

It occurs in the form of colourless, lustrous, crystalline scales, or as a crystalline powder, odourless, and having a slightly bitter taste. Soluble in cold water (1 in 320), more readily in boiling water, 45 per cent. alcohol (1 in 11), stronger alcohol, and ether. The aqueous solution is bitter and neutral. Melting-point,  $76^{\circ}$ ; on ignition it is consumed with evolution of sulphur dioxide, leaving no residue (absence of inorganic impurities). Gradually heated with dried sodium acetate, hydrogen sulphide is evolved. Heated with an equal weight of powdered charcoal in a dry test-tube it evolves the odour of mercaptan. On dissolving 1 gramme in 50 mls of boiling water no disagreeable odour should be developed (absence of mercaptan or mercaptol), and the solution when cooled and filtered should give no reaction with silver nitrate or barium chloride (absence of chlorides or sulphates). Half a decimil of solution of potassium permanganate (1 in 1000) when added to 10 mls of the solution should not be immediately decolourised (absence of readily oxidisable organic impurities).

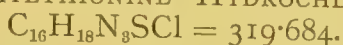
Methylsulphonal is a hypnotic, resembling sulphonal, but said to be more rapid in its action.

*Dose.*—1 to 2 grammes (15 to 30 grains); for children, 3 to 6 decigrams (5 to 10 grains).

*NOTES.*—Methylsulphonal is also known under the trade-name Trional. Like sulphonal it shows a remarkable resistance to oxidising agents.

## METHYLTHIONINÆ HYDROCHLORIDUM.

METHYLTHIONINE HYDROCHLORIDE.



*Synonyms.*—Tetramethyl-thionine Hydrochloride; Methylene Blue.

Methylthionine hydrochloride,  $\text{C}_{16}\text{H}_{18}\text{N}_3\text{SCl}$ , may be prepared by treating a hydrochloric acid solution of paramido-dimethylaniline with hydrogen sulphide, and then with ferric chloride; also by treating paramido-dimethylaniline hydrochloride with sodium nitrite, reducing with hydrogen sulphide, then oxidising with ferric chloride.

It occurs as a dull, dark green, crystalline powder, or in the form of prismatic crystals having a bronze-like lustre. Soluble in water (about 1 in 50); less soluble in alcohol. The solutions have an intense dark blue colour. The aqueous solution becomes lighter in shade on the addition of hydrochloric acid, and with sodium hydroxide develops a purplish or violet colour, excess of the reagent producing a dull violet precipitate. A solution of the dry powder in sulphuric acid, to which powdered zinc has been added, becomes gradually decolourised on standing. On ignition it should not leave more than 0.4 per cent. of ash, and should be entirely free from zinc

oxide (absence of commercial dye). It should be free from arsenium and other mineral impurities.

Methylene blue has been employed medicinally as an analgesic in migraine, neuralgia, sciatica, and rheumatism, but is of doubtful value for this purpose. It is used in the diarrhœa of phthisis, in tuberculous affections of the bladder, and in acute and chronic inflammations of the urinary passages, especially gonorrhœa and catarrhal inflammation of the bladder. It has been much recommended for use in malaria, when quinine is not well borne. As the aniline dyes are used to stain pathogenic organisms it was suggested that they had a greater affinity for these than for tissues. Hence it was suggested that if introduced into the body these dyes, whilst destroying micro-organisms, would leave the tissues unaffected. Methylene blue is usually administered in the form of a pill or enclosed in a gelatin capsule. Pills may be readily prepared with syrup of glucose as an excipient. As an anti-rheumatic the dye is sometimes combined with sodium salicylate; in cystitis and gonorrhœa it is given with sandal wood oil, copaiba, or formamine, enclosed in a capsule. Large doses (1 to 5 decigrams— $1\frac{1}{2}$  to 8 grains) have been given in malaria. As a lotion (0.25 per cent.) it is successfully employed in ozœna. Methylene blue is used as a means of determining the degree of permeability of the kidney. For this purpose 1 mil of a 5 per cent. sterile solution is injected deeply into the gluteal muscles; in normal conditions of the kidney, the urine becomes a greenish colour in thirty minutes, the colour deepening up to the fourth hour. A more rapid or delayed excretion serves as an indication of the degree of renal lesion. Methylene blue, taken internally, dyes the urine and fæces a greenish-blue. Stains on the skin or on linen may be removed with solution of chlorinated soda.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTES.*—Methylene blue is largely used in cotton-yarn dyeing, and in calico printing with tannin, but has no special application in dyeing skin or wool, other and faster dyes being used for these materials. It is of considerable value as a staining material in bacteriological work, and is a member of the class of "basic" dyes. Many varieties are in use for histological and bacteriological staining, according to the purpose for which they are employed. When aqueous solutions of medicinal methylene blue and of eosin are mixed, a precipitate of eosinate of methylene blue is formed, which, dissolved in methyl alcohol, is an important "neutral" stain for blood cells. Commercial methylene blue is the double chloride of tetramethylthionine and zinc. It may readily be distinguished from the medicinal salt by the ignition test. Care should also be taken not to confound methylene blue with methyl blue (the sodium salt of triphenyl-pararosanine-trisulphonic acid) which is unsuitable for internal use. In prescribing, the name methylene blue should be written in full.

## MEZEREI CORTEX.

MEZEREON BARK.

*Synonyms.*—Mezereum; Mezereon.

Mezereon bark is obtained from *Daphne Mezereum*, Linn., *D. Laureola*, Linn., or *D. Gnidium*, Linn. (N.O. Thymelacææ). *D.*



*Mezereum* and *D. Laureola* are indigenous to Britain, *D. Gnidium* to Southern Europe and Algeria. The commercial drug is chiefly derived from *D. Mezereum* and *D. Gnidium*. The bark is stripped in the spring from the entire plant, and dried; it is often made up into small rolls or bundles (*D. Gnidium*), but much is sold loose.

It occurs in long, thin, flattened or quilled, very tough and flexible fibrous strips, about 0·5 to 2 centimetres wide, from which the papery cork easily separates. The cork of *D. Mezereum* is olive-brown or yellowish in colour, and bears scattered rounded scars of buds and leaves; inner surface whitish and silky. The bark of *D. Gnidium* may be distinguished by its dark purplish-brown colour; the scars resemble those of *D. Mezereum*. *D. Laureola* has a purplish-grey cork, and the scars are pointed-oval in shape, and crowded at intervals. The drug is odourless or nearly so, but possesses a persistent, burning, acrid taste.

The chief constituent of mezereon bark is a greenish-brown, amorphous, acrid resin (mezerein), which readily changes into a bitter, acid resin (mezereic acid). A crystalline bitter glucoside, fixed oil, and a substance resembling euphorbone have also been isolated, but none of these is acrid. It yields about 3 per cent.

Mezereon bark is not much used internally. It was formerly employed in the treatment of syphilis and is still an ingredient of *Liquor Sarsæ Compositus Concentratus*. Applied externally, it is stimulant and vesicant, the fresh bark especially so. In some parts of Europe a small piece of the fresh bark is moistened with vinegar and applied to the skin to produce a blister. An ethereal extract of mezereon was formerly official, and was used as an ingredient of compound mustard liniment for its stimulating and vesicating properties.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

## MISTURA ACACIÆ.

### ACACIA MIXTURE.

*Synonym*.—Potion Gommeuse.

Gum Acacia, in coarse powder	...	...	6·00
Syrup	...	...	16·00
Orange-flower Water	...	...	6·00
Distilled Water, sufficient to produce	...	...	100·00

Dissolve the gum by trituration with the orange-flower water and syrup previously mixed, and add sufficient distilled water to produce the required volume.

Acacia mixture is employed as a demulcent in cough syrups and linctuses.

*Dose*.—4 to 16 mls (1 to 4 fluid drachms).

NOTE.—This preparation must not be confused with *Mucilago Acaciæ*.

**MISTURA ACIDI HYDROCYANICI COMPOSITA.**

COMPOUND MIXTURE OF HYDROCYANIC ACID.

*Synonym.*—Brompton Hospital Mixture.

	In 100 parts	In 4 fl. dr. about
Diluted Hydrocyanic Acid ... ..	1·00	2½ minims
Solution of Morphine Hydrochloride...	3·00	7½ minims
Syrup of Balsam of Tolu ... ..	16·00	
Acid Infusion of Roses, sufficient to produce ... ..	100·00	

Mix the liquids.

This is a sedative cough mixture, especially useful in phthisis.

*Dose.*—8 to 15 mils (2 to 4 fluid drachms).**MISTURA ÆTHERIS CUM AMMONIA.**

ETHER MIXTURE WITH AMMONIA.

*Synonym.*—Patent Mixture.

	In 100 parts	In 1 fl. oz. about
Spirit of Ether ... ..	6·00	30 minims
Aromatic Spirit of Ammonia ... ..	6·00	30 minims
Distilled Water, sufficient to produce	100·00	

Mix the spirits with the water.

This mixture is used as a rapid stimulant, acting mainly reflexly through the mouth and stomach; as a carminative in flatulence; and as an antispasmodic.

*Dose.*—15 to 30 mils (½ to 1 fluid ounce).**MISTURA ALBA.**

WHITE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Magnesium Carbonate ... ..	2·25	10 grains
Magnesium Sulphate ... ..	14·00	60 grains
Peppermint Water, sufficient to produce	100·00	

Mix the salts with the water.

This is a valuable, saline, cathartic mixture for general use, producing no irritation.

*Dose.*—15 to 30 mils (½ to 1 fluid ounce).**MISTURA AMMONIACI.**

AMMONIACUM MIXTURE.

Ammoniacum, in coarse powder ... ..	3·00
Syrup of Balsam of Tolu ... ..	6·00
Distilled Water, sufficient to produce ...	100·00

Add a small quantity of water to the ammoniacum, and rub to a thin paste; then gradually add the remainder of the water and the syrup, continue the trituration until a uniform milky mixture is obtained, and strain through muslin.

This mixture is mainly employed in treating chronic bronchitis, especially in the aged, and when there is much expectoration.

*Dose*.—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA AMMONIÆ CUM SENEGA.

#### AMMONIA MIXTURE WITH SENEGA.

	In 100 parts	In 1 fl. oz. about
Ammonium Carbonate...	1'00	5 grains
Ipecacuanha Wine ...	2'00	10 minims
Infusion of Senega ...	50'00	240 minims
Distilled Water, sufficient to produce	100'00	

Dissolve the ammonium carbonate in the liquids.

This is a powerful expectorant mixture. All the ingredients directly excite the mucous membrane of the stomach and reflexly increase the bronchial secretion.

*Dose*.—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA AMYGDALÆ.

#### ALMOND MIXTURE.

Compound Powder of Almonds ...	12'50
Distilled Water, sufficient to produce ...	100'00

Add a small quantity of water to the powder, and rub to a thin paste; then gradually add the remainder of the water, and strain through fine muslin.

Almond mixture is employed as a demulcent vehicle for cough mixtures, and to suspend paraldehyde, terebene, and similar drugs not readily miscible with water.

*Dose*.—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA AMYGDALÆ AMARÆ.

#### BITTER ALMOND MIXTURE.

Bitter Almonds ...	8'00
Distilled Water, sufficient to produce ...	100'00

Blanch the almonds in cold water and triturate with a little of the distilled water to form a thin paste; then gradually add sufficient distilled water to make up the required volume, and strain through fine muslin.

This preparation is used as a basis for skin lotions.

### MISTURA AMYL NITRITIS.

#### AMYL NITRITE MIXTURE.

	In 4 fl. dr. about
Amyl Nitrite ...	1 $\frac{1}{8}$ minims
Alcohol ...	12 minims
Tragacanth, in powder ...	1 grain
Syrup ...	30 minims
Distilled Water, sufficient to produce	100'00



Mix the amyl nitrite with the alcohol, and add to the tragacanth in a dry phial; then add the syrup, shake, and add the water gradually.

This mixture is a vaso-dilator, but the amyl nitrite takes longer to act than when it is inhaled.

*Dose.*—8 to 15 mls (2 to 4 fluid drachms).

### MISTURA ASAFETIDÆ COMPOSITA.

#### COMPOUND ASAFETIDA MIXTURE.

	In 100 parts	In 1 fl. oz. about
Asafetida, picked ... ..	1·15	5 grains
Liquid Extract of Cascara Sagrada ...	2·00	10 minims
Ammonium Carbonate ... ..	1·15	5 grains
Infusion of Valerian, sufficient to produce ... ..	100·00	

Triturate the asafetida to a smooth emulsion with part of the infusion, decant from coarse particles, and add the remainder of the infusion. The ammonia in this mixture intensifies the taste and odour of the other constituents.

This is a laxative mixture with a nauseous smell and taste, for use specially in hysterical and nervous conditions, with the object of producing a profound psychical effect.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA BISMUTHI.

#### BISMUTH MIXTURE.

	In 100 parts	In 1 fl. oz. about
Glycerin of Bismuth Carbonate ...	6·00	30 minims
Distilled Water, sufficient to produce	100·00	

Mix the liquids.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

NOTE.—This preparation contains 15 grains of bismuth carbonate in 1 fluid ounce.

### MISTURA BISMUTHI COMPOSITA.

#### COMPOUND BISMUTH MIXTURE.

	In 100 parts	In 1 fl. dr. about
Bismuth Citrate ... ..	9·00	5 grains
Solution of Ammonia, a sufficient quantity.		
Chloroform ... ..	1·00	$\frac{3}{4}$ minim
Tincture of Nux Vomica ... ..	12·50	7 $\frac{1}{2}$ minims
Diluted Hydrocyanic Acid ... ..	3·25	2 minims
Solution of Carmine ... ..	0·75	$\frac{1}{2}$ minim
Distilled Water, sufficient to produce	100·00	

Triturate the bismuth citrate with a little of the water, add solution of ammonia until the salt is just dissolved, and make up to 75 with distilled water. Dissolve the chloroform in the tincture of nux vomica, and add to the bismuth solution, then add the solution of

carmines, filter, and wash the filter paper with sufficient distilled water to produce with the hydrocyanic acid 100 of finished product.

This mixture is a valuable gastric sedative, used in pyrosis and gastric catarrh. The object of the hydrocyanic acid is to act as a local anæsthetic, and of the nux vomica to increase tonus.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—If a bismuth mixture containing morphine be desired, *Mistura Bismuthi Composita cum Morphina* should be used.

### MISTURA BISMUTHI COMPOSITA CUM MORPHINA.

COMPOUND BISMUTH MIXTURE WITH MORPHINE.

	In 100 parts	In 1 fl. dr. about
Morphine Hydrochloride ... ..	0.075	$\frac{1}{24}$ grain
Compound Bismuth Mixture, sufficient to produce ... ..	100.00	

Dissolve the morphine hydrochloride in the mixture.

This mixture is a stronger sedative than *Mistura Bismuthi Composita*, for use in allaying persistent vomiting and gastric pain. The bismuth prevents reflex peristalsis by protecting the mucous membrane from irritating juices and particles of food; the morphine paralyses some portion of Auerbach's plexus, and so prevents peristalsis.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### MISTURA BISMUTHI COMPOSITA CUM PEPSINO.

COMPOUND BISMUTH MIXTURE WITH PEPSIN.

	In 100 parts	In 1 fl. dr. about
Bismuth Citrate ... ..	9.00	5 grains
Solution of Ammonia, a sufficient quantity.		
Pepsin ... ..	2.00	1 grain
Chloroform ... ..	1.00	$\frac{3}{5}$ minim
Tincture of Nux Vomica ... ..	12.50	$7\frac{1}{2}$ minims
Diluted Hydrocyanic Acid ... ..	3.25	2 minims
Solution of Carmine ... ..	0.75	$\frac{1}{2}$ minim
Distilled Water, sufficient to produce	100.00	

Triturate the bismuth citrate with a little of the water, add solution of ammonia until the salt is just dissolved, and make up to 50 with distilled water. Dissolve the pepsin in 25 of water and add to the bismuth solution, then add the chloroform dissolved in the tincture of nux vomica, add the carmine solution, filter, and wash the filter paper with distilled water, add the hydrocyanic acid and sufficient distilled water to produce 100 of finished product.

This mixture is used to assist digestion, and as a sedative and tonic in chronic gastric catarrh.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**MISTURA BISMUTHI CUM SODA.**

## BISMUTH MIXTURE WITH SODA.

	In 100 parts	In 1 fl. oz. about
Sodium Bicarbonate ... ..	2·25	10 grains
Bismuth Mixture, sufficient to produce	100·00	

Dissolve the sodium bicarbonate in the bismuth mixture.

This mixture is employed in gastritis, to allay vomiting, and to arrest diarrhoea. The bismuth acts mechanically by preventing irritating particles of food coming in contact with the gut, whilst the alkali inhibits gastric secretion, and so rests the stomach.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA BUCHU COMPOSITA.**

## COMPOUND BUCHU MIXTURE.

	In 100 parts	In 1 fl. oz. about
Potassium Citrate ... ..	4·50	20 grains
Tincture of Hyoscyamus ... ..	3·00	15 minims
Infusion of Buchu, sufficient to produce	100·00	

Dissolve the potassium citrate in the liquids.

This mixture is a diuretic and urinary sedative employed in cystitis, catarrh of bladder, nervous retention of urine and incontinence.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA BUTYL-CHLORAL HYDRAS.**

## BUTYL-CHLORAL HYDRATE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Butyl-chloral Hydrate ... ..	1·00	$4\frac{1}{2}$ grains
Glycerin ... ..	3·00	15 minims
Chloroform Water ... ..	50·00	240 minims
Distilled Water, sufficient to produce	100·00	

Dissolve the butyl-chloral hydrate in the liquids.

This mixture is used as an analgesic in facial neuralgia, although butyl-chloral has no greater effect on the fifth cranial nerve than chloral.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA CARMINATIVA.**

## CARMINATIVE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Sodium Bicarbonate ... ..	2·25	10 grains
Aromatic Spirit of Ammonia ... ..	2·50	12 minims
Compound Tincture of Cardamoms ... ..	5·00	24 minims
Glycerin ... ..	8·00	40 minims
Dill Water, sufficient to produce	100·00	

Dissolve the sodium bicarbonate in the liquids.

This mixture is an aromatic stimulant and carminative, given before meals in bilious dyspepsia with acidity and loss of appetite.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).



**MISTURA CASCARÆ SAGRADÆ.**

## CASCARA SAGRADA MIXTURE.

	In 100 parts	In 1 fl. oz. about
Liquid Extract of Cascara Sagrada ...	6'00	30 minims
Liquid Extract of Liquorice ...	6'00	30 minims
Aromatic Spirit of Ammonia ...	4'00	20 minims
Chloroform Water, sufficient to produce	100'00	

Mix the liquids.

This mixture is employed as a mild purgative in chronic constipation.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

*NOTES.*—The ammonia prevents the formation of an unsightly deposit in this mixture. The mixture loses its bitter taste after standing several weeks.

**MISTURA CASCARÆ SAGRADÆ COMPOSITA.**

## COMPOUND CASCARA SAGRADA MIXTURE.

	In 100 parts	In 1 fl. oz. about
Liquid Extract of Cascara Sagrada ...	4'00	20 minims
Liquid Extract of Liquorice ...	6'00	30 minims
Tincture of Belladonna ...	1'00	5 minims
Tincture of Nux Vomica ...	1'00	5 minims
Aromatic Spirit of Ammonia ...	4'00	20 minims
Chloroform Water, sufficient to produce	100'00	

Mix the liquids.

The addition of nux vomica and belladonna increases the purgative action of the cascara, and the atropine removes the sense of griping. This mixture gradually loses its bitterness.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA CASCARILLÆ COMPOSITA.**

## COMPOUND CASCARILLA MIXTURE.

	In 100 parts	In 1 fl. oz. about
Compound Tincture of Camphor ...	3'00	15 minims
Vinegar of Squill ...	3'00	15 minims
Infusion of Cascarilla, sufficient to produce	100'00	

Mix the liquids.

This mixture is employed as an expectorant in chronic bronchitis and emphysema.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA CHLORAMIDI COMPOSITA.**

## COMPOUND CHLORAMIDE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Chloramide ...	6'75	30 grains
Potassium Bromide ...	6'75	30 grains
Alcohol ...	15'00	72 minims
Distilled Water, sufficient to produce	100'00	

Dissolve the chloramide in the alcohol, and add to the potassium bromide, previously dissolved in the distilled water.

This mixture is used as a sedative and hypnotic to induce sleep. It is also much employed to prevent and allay sea-sickness. For this purpose a dose should be taken before going on board, and another dose on sailing.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA CHLOROFORMI COMPOSITA.

#### COMPOUND CHLOROFORM MIXTURE.

	In 100 parts	In 2 fl. dr. about
Morphine Hydrochloride ... ..	0·05	$\frac{1}{16}$ grain
Diluted Hydrobromic Acid ... ..	25·00	30 minims
Chloroform ... ..	0·25	$\frac{1}{3}$ minim
Tincture of Cudbear ... ..	6·00	$7\frac{1}{2}$ minims
Syrup of Wild Cherry ... ..	25·00	30 minims
Syrup, sufficient to produce ... ..	100·00	

Dissolve the morphine hydrochloride in the diluted hydrobromic acid, add the syrup of wild cherry and the chloroform dissolved in the tincture of cudbear, and sufficient syrup to produce the required volume.

This is used as a sedative mixture in cough, especially the cough of phthisis.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

### MISTURA CINCHONÆ ACIDA.

#### ACID CINCHONA MIXTURE.

	In 100 parts	In 1 fl. oz. about
Liquid Extract of Cinchona ... ..	2·00	10 minims
Diluted Nitric Acid ... ..	2·00	10 minims
Aromatic Syrup... ..	6·00	30 minims
Distilled Water, sufficient to produce	100·00	

Mix the liquid extract of cinchona with the aromatic syrup and add the diluted nitric acid gradually; then add the distilled water in successive portions, stirring the mixture constantly.

This mixture is used as a simple bitter and as a "tonic" in general debility and during convalescence from acute diseases.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA COLCHICI.

#### COLCHICUM MIXTURE.

	In 100 parts	In 1 fl. oz. about
Colchicum Wine ... ..	3·00	15 minims
Magnesium Carbonate... ..	2·25	10 grains
Magnesium Sulphate ... ..	3·50	15 grains
Peppermint Water, sufficient to produce	100·00	

Mix the magnesium carbonate and sulphate with the liquids by trituration.

Colchicum mixture is a saline purgative, generally used in gouty conditions.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA COPAIBÆ.

#### COPAIBA MIXTURE.

	In 100 parts	In 1 fl. oz. about
Copaiba ... ..	3.00	15 minims
Mucilage of Gum Acacia ... ..	6.00	30 minims
Distilled Water, sufficient to produce	100.00	

Emulsify the copaiba by adding it gradually to the mucilage with constant trituration.

Copaiba mixture is employed as a diuretic and antiseptic in cystitis and gonorrhœa.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA CREOSOTI.

#### CREOSOTE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Creosote ... ..	0.20	1 minim
Spirit of Juniper ... ..	0.20	1 minim
Syrup ... ..	6.00	30 minims
Distilled Water, sufficient to produce	100.00	

Add the creosote to 88 of the water, shake thoroughly, then add the syrup, spirit, and sufficient water to make up the required volume.

Creosote mixture is employed in flatulence and dyspepsia to arrest gastric fermentation. It is used also for its antiseptic action during excretion by the bronchioles; for example in phthisis it may be of use in converting a mixed infection into a simple tubercle.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA CRETÆ.

#### CHALK MIXTURE.

	In 100 parts	In 1 fl. oz. about
Prepared Chalk ... ..	3.125	14 grains
Tragacanth, in powder ... ..	0.4375	2 grains
Refined Sugar... ..	6.25	28 grains
Cinnamon Water, sufficient to produce	100.00	

Mix the solid ingredients, and gradually add the cinnamon water, triturating until a uniform mixture is obtained.

Chalk mixture is used almost entirely in diarrhœa.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

NOTE.—Mistura Cretæ, U.S.P., is prepared by mixing 2 of compound chalk powder with 4 of cinnamon water, and adding sufficient plain water to produce 100 by volume.



**MISTURA CRETÆ COMPOSITA.**

## COMPOUND CHALK MIXTURE.

*Synonym.*—Board of Health Cholera Mixture.

	In 100 parts	In 1 fl. oz. about
Aromatic Powder ... ..	2'00	9 grains
Aromatic Spirit of Ammonia ... ..	1'875	9 minims
Tincture of Catechu ... ..	6'25	30 minims
Compound Tincture of Cardamoms ... ..	3'75	18 minims
Tincture of Opium ... ..	0'625	3 minims
Chalk Mixture, sufficient to produce ...	100'00	

Triturate the aromatic powder with a small quantity of the chalk mixture, and gradually add sufficient of the latter to produce about 50 ; then add the tinctures and spirit, previously mixed together, and make up to the required volume with chalk mixture.

Compound chalk mixture is employed as an antacid, intestinal sedative and astringent in summer diarrhœa and cholera ; it should not be given to young children.

*Dose.*—30 mils (1 fluid ounce) for an adult ; 15 mils ( $\frac{1}{2}$  fluid ounce) for a child twelve years old ; 8 mils (2 fluid drachms) for a child seven years old. To be taken after each liquid motion.

**MISTURA DAMIANÆ COMPOSITA.**

## COMPOUND DAMIANA MIXTURE.

	In 100 parts	In 2 fl. dr. about
Liquid Extract of Damiana ... ..	25'00	30 minims
Liquid Extract of Nux Vomica ... ..	1'65	2 minims
Calcium Hypophosphite ... ..	4'50	5 grains
Sodium Hypophosphite ... ..	4'50	5 grains
Chloroform Water, sufficient to produce	100'00	

Dissolve the hypophosphites in 60 of the chloroform water, add the liquid extracts, mix, and make up the required volume by the addition of chloroform water.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**MISTURA ERGOTÆ.**

## ERGOT MIXTURE.

	In 100 parts	In 1 fl. oz. about
Liquid Extract of Ergot ... ..	6'25	30 minims
Diluted Sulphuric Acid ... ..	2'00	10 minims
Chloroform Water, sufficient to produce	100'00	

Mix the liquids.

Ergot mixture is used principally to arrest uterine hæmorrhage and promote uterine contraction.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

Amelichorda Trinitate (B. P. C.  
Dose; Neuroblastoseptum (for 708)





**MISTURA EXPECTORANS.**

## EXPECTORANT MIXTURE.

	In 100 parts	In 1 fl. oz. about
Solution of Ammonium Acetate ...	25'00	2 fl. drachms
Vinegar of Squill ... ..	3'30	16 minims
Vinegar of Ipecacuanha ... ..	5'00	24 minims
Glycerin ... ..	8'50	40 minims
Chloroform Water, sufficient to produce	100'00	

Mix the liquids.

This mixture is used for its diaphoretic and expectorant properties.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA FERRI AMARA.**

## BITTER IRON MIXTURE.

*Synonym.*—Mistura Chalybeata.

	In 100 parts	In 1 fl. oz. about
Solution of Ferric Chloride ... ..	3'00	15 minims
Syrup ... ..	6'00	30 minims
Infusion of Quassia, sufficient to produce	100'00	

Mix the liquids.

This mixture represents a common form of "iron tonic." It is astringent and apt to derange digestion.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA FERRI AMMONIATA.**

## AMMONIATED IRON MIXTURE.

	In 100 parts	In 1 fl. oz. about
Solution of Ferric Chloride ... ..	2'00	10 minims
Aromatic Spirit of Ammonia ... ..	4'00	20 minims
Syrup ... ..	8'00	40 minims
Distilled Water, sufficient to produce	100'00	

Mix the syrup with the iron solution and add the aromatic spirit of ammonia, previously diluted with the water.

The ingredients of this mixture should be combined in the order specified, as the sugar in the syrup prevents the precipitation of ferric hydroxide, which occurs on mixing an alkaline liquid with a solution of ferric salt. The resulting mixture is nearly neutral and almost free from styptic taste.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA FERRI AROMATICA.**

## AROMATIC IRON MIXTURE.

*Synonym.*—Heberden's Ink.

Red Cinchona Bark, in powder ... ..	6'00
Calumba Root, in powder ... ..	3'00
Cloves, bruised ... ..	1'50
Fine Iron Wire ... ..	3'00
Compound Tincture of Cardamoms ... ..	19'00
Tincture of Orange ... ..	3'00
Peppermint Water, sufficient to produce ...	100'00

Macerate the cinchona bark, calumba root, cloves, and iron wire with 75 of the peppermint water for three days in a closed vessel, agitating occasionally, then filter, pass as much peppermint water through the filter as will make the product measure 78, and add the tinctures.

Aromatic mixture of iron is much esteemed by some practitioners in dyspepsia with anæmia.

*Dose*.—30 to 60 mils (1 to 2 fluid ounces).

NOTES.—Mistura Ferri Aromatica was official in the British Pharmacopœia 1885. It should be kept in a well-stoppered bottle.

### MISTURA FERRI ARSENICALIS.

#### ARSENICAL IRON MIXTURE.

	In 100 parts	In 1 fl. oz. about
Arsenical Solution ... ..	0·40	2 minims
Iron and Ammonium Citrate ... ..	1·10	5 grains
Tincture of Calumba ... ..	2·00	10 minims
Distilled Water, sufficient to produce	100·00	

Dissolve the iron and ammonium citrate in part of the water, then add the other ingredients, and make up the required volume with distilled water.

This mixture provides a convenient way of prescribing iron and arsenic with a bitter.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA FERRI CARBONATIS COMPOSITA.

#### COMPOUND FERROUS CARBONATE MIXTURE.

*Synonym*.—Compound Iron Carbonate Mixture.

Ferrous Carbonate with Glucose ... ..	0·40
Syrup of Glucose ... ..	2·75
Gum Acacia, in powder ... ..	0·50
Tincture of Myrrh ... ..	5·00
Spirit of Nutmeg ... ..	1·00
Rose Water, sufficient to produce ... ..	100·00

Reduce the ferrous carbonate to fine powder, triturate it with the syrup of glucose, and continue the trituration with sufficient rose water to form a smooth, thin paste; then dilute the mixture gradually with more of the rose water, add the powdered acacia diffused in the tincture of myrrh and the spirit of nutmeg, and make up the volume to 100 with rose water.

This preparation is recommended for use in place of Mistura Ferri Composita, as it keeps unaltered for a much longer period.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA FERRI COMPOSITA.**

## COMPOUND IRON MIXTURE.

*Synonyms.*—Compound Mixture of Iron; Griffith's Mixture.

Ferrous Sulphate	...	...	...	...	0.57
Potassium Carbonate	...	...	...	...	0.686
Myrrh	...	...	...	...	1.37
Refined Sugar	...	...	...	...	1.37
Spirit of Nutmeg	...	...	...	...	1.04
Rose Water, sufficient to produce	...	...	...	...	about 100.00

Powder the myrrh, add the potassium carbonate and sugar, and triturate with sufficient rose water to form a thin paste; then gradually, with constant trituration, add the spirit of nutmeg and sufficient rose water to produce 70, and add the ferrous sulphate, previously dissolved, in 30 of the rose water.

The action of this mixture is that of ferrous carbonate, the myrrh and spirit of nutmeg being carminative.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

*NOTES.*—This mixture must be freshly prepared, or the mixture may be made without iron and the ferrous sulphate added at the time of dispensing. *Mistura Ferri Composita*, U.S.P., is prepared with 0.6 of ferrous sulphate, 0.8 of potassium carbonate, 1.8 of myrrh, 1.8 of sugar, 6 of spirit of lavender, and sufficient rose water to produce 100 by volume.

**MISTURA FERRI ET MAGNESII SULPHAS.**

## IRON AND MAGNESIUM SULPHATE MIXTURE.

*Synonym.*—*Mistura Ferri cum Magnesii Sulphate.*

	In 100 parts	In 1 fl. oz. about
Solution of Ferric Chloride	3.00	15 minims
Magnesium Sulphate	4.50	20 grains
Glycerin	8.00	40 minims
Infusion of Quassia, sufficient to produce	100.00	

Dissolve the magnesium sulphate in part of the infusion, then add the other ingredients, and make up the required volume with infusion of quassia.

It is a convenient chalybeate aperient.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA GENTIANÆ.**

## GENTIAN MIXTURE.

Gentian Root, sliced	...	...	...	2.50
Bitter Orange Peel, cut small...	...	...	...	0.75
Coriander Fruit, bruised	...	...	...	0.75
Alcohol (60 per cent.)	...	...	...	20.00
Distilled Water, sufficient to produce	...	...	...	100.00

Macerate the gentian root, orange peel, and coriander in the alcohol for two hours; then add the water, again macerate for two hours, and strain through calico.



Gentian mixture is employed as a bitter in dyspepsia and in any condition in which it is desired to improve the appetite.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

NOTE.—Mistura Gentianæ was official in the British Pharmacopœia, 1867.

### MISTURA GENTIANÆ ACIDA.

#### ACID GENTIAN MIXTURE.

	In 100 parts	In 1 fl. oz. about
Diluted Nitro-hydrochloric Acid ...	2'00	10 minims
Spirit of Chloroform ...	2'00	10 minims
Compound Infusion of Gentian, sufficient to produce ...	100'00	

Mix the liquids.

This preparation has the action of a simple bitter. It is commonly employed during convalescence.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA GENTIANÆ ET SODÆ.

#### GENTIAN AND SODA MIXTURE.

*Synonym*.—Mistura Gentianæ cum Soda.

	In 100 parts	In 1 fl. oz. about
Sodium Bicarbonate ...	3'00	15 grains
Compound Infusion of Gentian, sufficient to produce ...	100'00	

Dissolve the sodium bicarbonate in the infusion.

This mixture is given before meals to promote appetite and to prevent excessive secretion of gastric juice.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA GLYCYRRHIZÆ COMPOSITA.

#### COMPOUND LIQUORICE MIXTURE.

*Synonyms*.—Compound Mixture of Glycyrrhiza; Brown Mixture.

Extract of Liquorice ...	3'00
Syrup ...	5'00
Gum Acacia, in coarse powder ...	3'00
Compound Tincture of Camphor ...	12'00
Antimonial Wine ...	6'00
Spirit of Nitrous Ether ...	3'00
Distilled Water, sufficient to produce ...	100'00

Dissolve the extract of liquorice and gum acacia in 50 of distilled water by trituration, add the solution to the other ingredients, previously mixed, and make up the required volume with distilled water.

This preparation is a popular remedy for coughs in the acute and sub-acute stages of bronchitis and laryngitis. It allays irritation,

promotes the activity of the bronchial and laryngeal mucosa, and so increases secretion, overcomes congestion, and promotes expectoration.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

NOTE.—Mistura Glycyrrhizæ Composita, U.S.P., is prepared with Extractum Glycyrrhizæ Purum.

### MISTURA GUAIACI.

#### GUAIACUM MIXTURE.

	In 100 parts	In 1 fl. oz. about
Guaiacum Resin ... ..	2.50	11 grains
Refined Sugar ... ..	2.50	11 grains
Tragacanth, in powder... ..	0.40	1 $\frac{3}{4}$ grains
Cinnamon Water ... ..	100.00	

Powder the resin, add the sugar and tragacanth, mix thoroughly, then add the cinnamon water, gradually and with constant trituration.

This mixture is employed in chronic gout and rheumatism, also in tonsillitis and some skin diseases.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA HÆMATOXYLI CUM CATECHU.

#### LOGWOOD MIXTURE WITH CATECHU.

	In 100 parts	In 1 fl. oz. about
Tincture of Catechu ... ..	8.00	40 minims
Aromatic Sulphuric Acid ... ..	3.00	15 minims
Decoction of Logwood, sufficient to produce ... ..	100.00	

Mix the liquids.

This mixture is a powerful astringent for use in dysentery, diarrhœa such as that of phthisis, and to arrest hæmorrhage from the alimentary canal.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### MISTURA IPECACUANHÆ CUM SODA.

#### IPECACUANHA MIXTURE WITH SODA.

	In 100 parts	In 1 fl. oz. about
Sodium Bicarbonate ... ..	3.40	15 grains
Ipecacuanha Wine ... ..	2.00	10 minims
Aromatic Spirit of Ammonia ... ..	3.00	15 minims
Peppermint Water, sufficient to produce ... ..	100.00	

Dissolve the sodium bicarbonate in part of the peppermint water, then add the other ingredients and make up the required volume with peppermint water.

This mixture is employed as an expectorant and diaphoretic.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA JALAPÆ CUM RHEO.**

JALAP MIXTURE WITH RHUBARB.

	In 100 parts	In 1 fl. dr. about
Jalap Resin ... ..	0·45	$\frac{1}{4}$ grain
Compound Tincture of Rhubarb ...	17·00	10 minims
Tragacanth ... ..	0·45	$\frac{1}{4}$ grain
Syrup of Ginger ... ..	8·50	5 minims
Glycerin ... ..	17·00	10 minims
Caraway Water, sufficient to produce	100·00	

Powder the jalap resin, and triturate it with the tragacanth; then add the tincture, syrup, glycerin, and caraway water in the order given.

*Dose.*—4 mls (1 fluid drachm) for a child one year old; or 30 mls (1 fluid ounce) for an adult.

*NOTE.*—As the official extract of jalap varies considerably in strength, the resin of jalap is used in preparing this mixture, with tragacanth to suspend it.

**MISTURA OLEI RICINI.**

CASTOR OIL MIXTURE.

*Synonyms.*—Emulsio Olei Ricini; Castor Oil Emulsion.

	In 100 parts	In 2 fl. oz. about
Castor Oil ... ..	37·50	6 fl. drachms
Mucilage of Gum Acacia ... ..	18·75	3 fl. drachms
Orange-flower Water ... ..	12·50	2 fl. drachms
Cinnamon Water ... ..	31·25	

Place the mucilage in a mortar, and add gradually in alternate portions, with constant trituration, the oil and the previously mixed waters.

This mixture affords a convenient means of administering castor oil either to children or adults.

*Dose.*—30 to 60 mls (1 to 2 fluid ounces).

*NOTE.*—The following has been suggested as a simpler method of preparing this mixture:—Triturate 8·5 of powdered gum acacia in a dry mortar with 37·5 of castor oil; then add all at once 12·5 of orange-flower water mixed with half its volume of distilled water, mix intimately, and add, in small portions, 31·25 of cinnamon water, and sufficient distilled water to make up the required volume.

**MISTURA OLEI SANTALI.**

SANDAL WOOD OIL MIXTURE.

	In 100 parts	In 1 fl. oz. about
Oil of Sandal Wood ... ..	3·00	15 minims
Mucilage of Gum Acacia ... ..	6·00	30 minims
Cinnamon Water, sufficient to produce	100·00	

Emulsify the oil by adding it gradually to the mucilage, with constant trituration, and dilute gradually with the cinnamon water.

This mixture is used generally in gonorrhœa and urinary catarrh.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).



**MISTURA PEPSINI COMPOSITA.**

## COMPOUND PEPSIN MIXTURE.

	In 100 parts	In $\frac{1}{2}$ fl. oz., about
Stronger Glycerin of Pepsin ...	5.00	12 minims
Solution of Strychnine Hydrochloride	1.25	3 minims
Diluted Nitro-hydrochloric Acid ...	3.00	7 $\frac{1}{2}$ minims
Glycerin ... ..	10.00	24 minims
Tincture of Cudbear ... ..	5.00	12 minims
Distilled Water, sufficient to produce	100.00	

Mix the liquids and filter.

This mixture is used to assist digestion in wasting diseases and atonic dyspepsia, and in all conditions in which a deficiency of gastric juice is believed to exist.

*Dose.*—8 to 15 mls ( $\frac{1}{4}$  to  $\frac{1}{2}$  fluid ounce).

*NOTE.*—This preparation contains approximately 1 grain of pepsin in  $\frac{1}{2}$  fluid ounce.

**MISTURA PEPSINI CUM BYNO.**

## PEPSIN MIXTURE WITH MALT.

*Synonym.*—Essence of Pepsin and Malt.

	In 100 parts	In $\frac{1}{2}$ fl. oz., about
Stronger Glycerin of Pepsin ...	5.00	12 minims
Extract of Malt, by weight ...	30.00	65 grains
Alcohol (60 per cent.) sufficient to produce ... ..	100.00	

Mix the glycerin of pepsin with the extract of malt; then add sufficient of the alcohol to make up the required volume, and strain.

This mixture is employed as a nutritive and to assist defective digestion.

*Dose.*—8 to 15 mls ( $\frac{1}{4}$  to  $\frac{1}{2}$  fluid ounce).

**MISTURA POTASSII CHLORATIS.**

## POTASSIUM CHLORATE MIXTURE.

	In 100 parts	In 1 fl. oz., about
Potassium Chlorate ... ..	2.25	10 grains
Diluted Hydrochloric Acid ... ..	1.00	5 minims
Distilled Water, sufficient to produce	100.00	

Dissolve the potassium chlorate in the acid and water.

This mixture is given in stomatitis, tonsillitis, pharyngitis, and cystitis. During its excretion by the bronchioles and kidneys it is believed to oxidise putrid organic matter.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

*NOTE.*—This mixture, being made with diluted hydrochloric acid, contains only a trace of free chlorine.

**MISTURA POTASSII CITRATIS EFFERVESCENS.****EFFERVESCENT POTASSIUM CITRATE MIXTURE.**

Potassium Bicarbonate ... ..	13 decigrams (20 grains)
Citric Acid... ..	1 gramme (15 grains)
Distilled Water, a sufficient quantity.	

Dissolve the potassium bicarbonate in 30 mls (1 fluid ounce) of water, and the citric acid in 15 mls ( $\frac{1}{2}$  fluid ounce) of water. Mix the two solutions and drink during effervescence.

This forms a slightly acid draught. It is employed as a mild febrifuge in feverish conditions, and to allay sickness. Other remedies given with this mixture should be incorporated with the acid or alkaline solution, according to their compatibility—*e.g.*, citrate of iron and quinine with the acid solution, and aromatic spirit of ammonia with the alkaline solution.

*Dose.*—Mix 30 mls (1 fluid ounce) of the potassium bicarbonate mixture and 15 mls (4 fluid drachms) of the citric acid mixture and drink during effervescence.

**MISTURA POTASSII IODIDI ALKALINA.****ALKALINE POTASSIUM IODIDE MIXTURE.**

	In 100 parts	In 1 fl. oz. about
Potassium Iodide . . . . .	0.70	3 grains
Potassium Bicarbonate . . . . .	2.25	10 grains
Ammonium Carbonate... ..	0.70	3 grains
Camphor Water, sufficient to produce	100.00	

Dissolve the salts in the water.

This mixture is a saline expectorant and diuretic.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA POTASSII IODIDI ET STRAMONII.****POTASSIUM IODIDE AND STRAMONIUM MIXTURE.**

	In 100 parts	In 1 fl. oz. about
Potassium Iodide . . . . .	0.75	3 grains
Tincture of Stramonium . . . . .	1.00	5 minims
Chloroform Emulsion . . . . .	2.00	10 minims
Liquid Extract of Liquorice . . . . .	2.00	10 minims
Distilled Water, sufficient to produce...	100.00	

Dissolve the potassium iodide in part of the water, then add the tincture, extract, and emulsion, and make up the required volume with distilled water.

This is a common sedative and antispasmodic mixture for use in asthma.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA QUININÆ.**

## QUININE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Quinine Sulphate	0·23	1 grain
Diluted Sulphuric Acid	0·21	1 minim
Tincture of Orange	2·00	10 minims
Distilled Water, sufficient to produce	100·00	

Suspend the quinine sulphate in part of the water, add the acid, stir till dissolved, then add the tincture and make up the required volume with water.

This mixture is employed as a simple bitter to stimulate gastric secretion by improving the appetite; it is of value in the debility following acute illness.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA QUININÆ CUM FERRO.**

## QUININE MIXTURE WITH IRON.

	In 100 parts	In 1 fl. oz. about
Quinine Sulphate	0·23	1 grain
Solution of Ferric Chloride	2·00	10 minims
Distilled Water, sufficient to produce	100·00	

Dissolve the quinine sulphate in the liquids.

This is a convenient way of prescribing quinine and iron together.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA RHEI CUM SODA.**

## RHUBARB MIXTURE WITH SODA.

*Synonyms.*—Mistura Rhei et Sodæ; Rhubarb and Soda Mixture.

	In 100 parts	In 1 fl. oz. about
Rhubarb Root, in fine powder	1·15	5 grains
Sodium Bicarbonate	2·30	10 grains
Caraway Water, sufficient to produce	100·00	

Mix the powders, triturate them with sufficient of the water to form a smooth mixture, then add sufficient caraway water to produce the required volume.

This mixture is employed as a mild laxative and antacid "stomachic"; that is if given twenty minutes before a meal it inhibits much of the normal gastric secretion and so rests the stomach.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

*NOTES.*—Mistura Rhei et Sodæ, U.S.P., is prepared by dissolving  $3\frac{1}{2}$  of sodium bicarbonate in about 40 of water, then adding  $1\frac{1}{2}$  of liquid extract of rhubarb, 0·2 of liquid extract of ipecacuanha, 35 of glycerin,  $3\frac{1}{2}$  of spirit of peppermint, and sufficient water to produce 100. Average dose, 4 mils (1 fluid drachm).



**MISTURA SALINA.**

## SALINE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Solution of Ammonium Acetate ...	37.50	3 fl. drachms
Potassium Nitrate ... ..	2.30	10 grains
Spirit of Nitrous Ether ... ..	6.00	30 minims
Distilled Water, sufficient to produce	100.00	

Dissolve the potassium nitrate in part of the water, add the other ingredients, and make up the required volume with water.

This mixture is used as a diaphoretic and diuretic.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA SALINA ANODYNA.**

## ANODYNE SALINE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Tincture of Opium ... ..	2.00	10 minims
Saline Mixture, sufficient to produce...	100.00	

Mix the liquids.

This is a favourite diaphoretic and sedative mixture for use in simple colds and chills.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA SALINA LAXANS.**

## LAXATIVE SALINE MIXTURE.

	In 100 parts	In 1 fl. oz. about
Magnesium Sulphate ... ..	7.00	30 grains
Potassium Citrate ... ..	4.60	20 grains
Tincture of Hyoscyamus ... ..	3.00	15 minims
Chloroform Water, sufficient to produce	100.00	

Dissolve the salts in part of the water, add the tincture, and make up the required volume with chloroform water.

This mixture is employed as an aperient and diuretic, as, for example, in conditions such as the acute stage of gonorrhœa.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA SANTALI COMPOSITA.**

## COMPOUND SANDAL WOOD MIXTURE.

	In 100 parts	In 1 fl. dr. about
Oil of Sandal Wood ... ..	30.00	18 minims
Oil of Cassia ... ..	3.50	2 minims
Oil of Pimento ... ..	1.50	$\frac{7}{8}$ minim
Alcohol, sufficient to produce ... ..	100.00	

Dissolve the oils in the alcohol.

This mixture is used for gleet and gonorrhœa, being given with water or milk thrice daily.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**MISTURA SANTALI COMPOSITA CUM MORPHINA.**

COMPOUND SANDAL WOOD MIXTURE WITH MORPHINE.

	In 100 parts	In 1 fl. dr. about
Oil of Sandal Wood ... ..	35.00	21 minims
Oil of Cassia ... ..	2.25	1 $\frac{3}{8}$ minims
Oil of Pimento ... ..	4.50	2 $\frac{3}{4}$ minims
Morphine Hydrochloride ... ..	0.15	$\frac{1}{12}$ grain
Alcohol, sufficient to produce ... ..	100.00	

Dissolve the oils and the morphine hydrochloride in the alcohol.

This mixture is used for similar purposes and in the same way as Mistura Santali Composita.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).**MISTURA SCAMMONII.**

SCAMMONY MIXTURE.

Scammony, in powder ... ..	0.75
Milk ... ..	100.00

Triturate the scammony with the milk until a uniform emulsion is obtained. The mixture should be freshly made as required.

Scammony mixture is occasionally employed as a brisk cathartic in dropsy and cerebral affections, but has a tendency to gripe.

*Dose.*—30 to 90 mls (1 to 3 fluid ounces).

NOTE.—This mixture was official in the British Pharmacopœia, 1885.

**MISTURA SCILLÆ.**

SQUILL MIXTURE.

*Synonym.*—Fothergill's Cough Mixture.

	In 100 parts	In $\frac{1}{2}$ fl. oz. about
Syrup of Squill ... ..	10.00	24 minims
Diluted Hydrobromic Acid ... ..	5.00	12 minims
Spirit of Chloroform ... ..	5.00	12 minims
Distilled Water, sufficient to produce ... ..	100.00	

Mix the syrup of squill with the other ingredients.

The mixture is given for coughs, and is intended to be sipped slowly.

*Dose.*—8 to 15 mls (2 to 4 fluid drachms), three times a day.**MISTURA SCILLÆ COMPOSITA.**

COMPOUND SQUILL MIXTURE.

	In 100 parts	In 1 fl. oz. about
Compound Tincture of Camphor ... ..	4.00	20 minims
Oxymel of Squill ... ..	8.00	40 minims
Spirit of Nitrous Ether ... ..	4.00	20 minims
Distilled Water, sufficient to produce ... ..	100.00	

Mix the liquids.

This mixture is used as a diaphoretic and expectorant.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA SCILLÆ ET IPECACUANHÆ.****SQUILL AND IPECACUANHA MIXTURE.**

	In 100 parts	In 1 fl. oz. about
Vinegar of Squill ... ..	2'00	10 minims
Vinegar of Ipecacuanha ... ..	2'00	10 minims
Potassium Citrate ... ..	3'45	15 grains
Solution of Ammonium Acetate ... ..	25'00	2 fl. drachms
Anise Water, sufficient to produce ...	100'00	

Dissolve the potassium citrate in part of the water ; then add the other ingredients, and make up the required volume with anise water.

This mixture is a diaphoretic and expectorant mixture.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA SCILLÆ ET OPII.****SQUILL AND OPIUM MIXTURE.**

*Synonym.*—Abercrombie's Cough Mixture.

	In 100 parts	In $\frac{1}{2}$ fl. oz. about
Syrup of Squill ... ..	20'00	48 minims
Tincture of Opium ... ..	3'33	8 minims
Cinnamon Water ... ..	40'00	
Distilled Water, sufficient to produce	100'00	

Mix the tincture with the syrup and add the waters.

*Dose.*—8 to 15 mils (2 to 4 fluid drachms).

**MISTURA SENNÆ COMPOSITA.****COMPOUND SENNA MIXTURE.**

*Synonyms.*—Compound Mixture of Senna ; Black Draught.

	In 100 parts	In 2 fl. oz. about
Magnesium Sulphate ... ..	25'00	220 grains
Liquid Extract of Liquorice ... ..	5'00	48 minims
Compound Tincture of Cardamoms ...	10'00	96 minims
Aromatic Spirit of Ammonia ... ..	5'00	48 minims
Infusion of Senna, sufficient to produce	100'00	

Add the magnesium sulphate to 50 of the infusion, dissolve, add the previously mixed liquid ingredients, and make up the required volume with infusion of senna.

This mixture is a brisk purgative, useful in occasional constipation and to clear out the bowels.

*Dose.*—30 to 60 mils (1 to 2 fluid ounces).

*NOTE.*—It has been stated that this mixture acts more effectively when prepared without the aromatic spirit of ammonia.



**MISTURA SODÆ COMPOSITA.**

COMPOUND SODA MIXTURE.

*Synonym.*—Peacock's Stomachic Mixture.

	In 100 parts.	In 1 fl. oz. about
Gentian Root, cut small and well bruised ... ..	1'15	5 grains
Rhubarb Root, in coarse powder ...	0'46	2 grains
Ginger, in coarse powder ... ..	0'23	1 grain
Sodium Bicarbonate ... ..	2'30	10 grains
Peppermint Water, sufficient to produce	100'00	

Macerate the gentian, rhubarb, ginger, and sodium bicarbonate in 100 of peppermint water for twenty-four hours; then press out the liquor, strain, and pour sufficient peppermint water through the strainer to make up the required volume.

This is a valuable stomachic mixture for some forms of dyspepsia, and should be given twenty minutes before a meal.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURA SPIRITUS VINI GALLICI.**

BRANDY MIXTURE.

*Synonym.*—Mixture of Brandy.

Brandy ... ..	40'00
Cinnamon Water ... ..	40'00
Refined Sugar ... ..	5'00
Yolk of Egg, by volume ... ..	10'00

Triturate the yolk of egg with the sugar; then mix with the cinnamon water and brandy.

This is a stimulant to the heart and circulation, and a valuable food in certain acute diseases.

*Dose.*—30 to 50 mils (1 to 2 fluid ounces).

**MISTURA STRYCHNINÆ ACIDA.**

ACID STRYCHNINE MIXTURE.

	In 100 parts.	In 1 fl. oz. about
Solution of Strychnine Hydrochloride	0'60	3 minims
Diluted Nitro-hydrochloric Acid ...	3'00	15 minims
Glycerin ... ..	6'00	30 minims
Compound Infusion of Gentian, sufficient to produce ... ..	100'00	

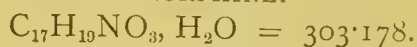
Mix the liquids.

This mixture is a true tonic, as it increases the tone of muscle by the action of the strychnine on the spinal cord. The gentian increases the bitterness of the taste, and assists to improve the appetite.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**MISTURÆ.****MIXTURES.**

Mixtures are liquid preparations intended for the administration of a medicinal substance or substances either in solution or suspension, and compounded in such a manner as to ensure perfect distribution throughout the bulk, with a view to accuracy of dose. Stock mixtures may, if necessary, be preserved by the addition of 2 to 3 per cent. of Emulsio Chloroformi.

**MORPHINA.****MORPHINE.**

Morphine,  $\text{C}_{17}\text{H}_{19}\text{NO}_3, \text{H}_2\text{O}$ , is the principal alkaloid occurring in opium, in which it exists in combination with meconic acid (and probably also with sulphuric acid) to the extent of from 4 to 20 per cent. or even more. It may be isolated by various methods, the final step usually being the addition of ammonia in slight excess to an acid solution of the base, the precipitate being washed with water until free from ammonium salt, and recrystallised from alcohol.

It occurs in fine, colourless or white needle-shaped crystals, or as a white, crystalline powder, permanent in air, odourless, and having a bitter taste. Soluble, very slightly in cold water; in hot water (about 1 in 400); in alcohol (1 in 100); in boiling alcohol (1 in 14); almost insoluble in cold ether, chloroform (1 in 4167), and benzol (1 in 3250); not very soluble in acetic ether or in amylic alcohol; soluble in oleic acid (1 in 10), in glycerin (1 in 125), and in solutions of the caustic alkalies, but very sparingly soluble in ammonia and the alkali carbonates; soluble in acids to form crystalline salts, from solutions of which it is precipitated by ammonia, but not by potassium hydroxide. Its aqueous solution is alkaline to litmus and is lævo-rotatory. The potassium hydroxide solution should not evolve the odour of ammonia (absence of ammonia salts). It loses its water of crystallisation at about  $128^\circ$ , melts with decomposition at  $230^\circ$ , and on complete ignition it is entirely consumed and leaves no residue. Distilled with potassium hydroxide it yields methylamine. With pure sulphuric acid in the cold it yields no colouration or only a slightly yellow tint, but on heating a brown colour is developed. Nitric acid produces an orange-red colour fading to yellow. Dissolved in sulphuric acid, made hot by the addition of a few drops of water, and a drop of nitric acid added, a red colour is produced. Sulphuric acid with a trace of molybdic acid yields a purple colour, changing to blue. Sulphuric acid containing one drop of formaldehyde to each mil yields an intense purple colour. Its solution in diluted sulphuric acid produces with potassio-mercuric iodide solution a copious white precipitate. A 5 per cent. solution of sodium phosphomolybdate produces in solu-

tions of morphine a yellow precipitate soluble in ammonia. Sulphuric acid containing a crystal of potassium bichromate yields no colour at first, but after some time a green colour (absence of strychnine, which gives a purple colour). Morphine acts in many cases as a reducing agent. If a solution of morphine be mixed with a solution of starch and gently evaporated on a white porcelain surface, the residue after cooling, on being moistened with iodic acid, will produce a blue colouration. Minute traces may be detected in this way. Morphine solutions heated with an aqueous solution of potassium ferricyanide containing a drop of neutral ferric chloride give a deep blue solution which, on standing, throws down a blue precipitate (difference from codeine). When boiled with solution of silver nitrate, silver is precipitated. Ten mils of a 1 per cent. solution in diluted hydrochloric acid yields no red colour on the addition of a few drops of ferric chloride (absence of meconic acid or meconates).

Morphine and its salts differ from other hypnotics in that they depress sensory nerve cells in the cerebrum, whilst most other hypnotics paralyse motor and sensory cells simultaneously. The paralysis in the brain occurs in the reverse order of the development of the different parts; thus self-control, judgment, and attention, which represent some of the highest attributes of mind, are some of the first to go. Later, feelings and sensations of all kinds are diminished and a condition of dreamy abstraction is produced, followed by drowsiness and sleep. Sometimes there may be delusions, such as prolonged estimation of time and space, rarely is there excitement, but emotional races in Eastern countries, such as the Malays, occasionally develop a kind of mania, and in Europe many cases have been recorded in which women and children, after a morphine injection, have for a time shown signs of violent excitement. Because of this action on the cerebral hemispheres, morphine is the most valuable drug we possess for the treatment of pain. It is of great value as a remedy for sleeplessness due to painful disease. For internal hæmorrhage injections of morphine form a routine treatment; they act by soothing the patient, stopping restlessness, and so keeping blood pressure low. In acute febrile disease, especially where sleep is delayed, morphine is invaluable; it has lately come much into vogue in the treatment of pneumonia, but its employment in malaria has been superseded by quinine, and it is less valuable in the treatment of mania, epilepsy, chorea, and the like. Morphine depresses the medulla, diminishes gaseous metabolism, and is used to arrest useless coughs, but its employment is contra-indicated in conditions where there is much expectoration. It is largely prescribed with expectorants in the coughs of phthisis and bronchitis. As morphine has a specific action on the alimentary canal, diminishing peristalsis, it is employed in the treatment of diarrhœa and colic, especially that due to lead. In peritonitis it is especially valuable, diminishing the pain, restlessness, and peristaltic movements; it should not be given, however, until a



working diagnosis has been made. Morphine has few peripheral actions, it does not affect the heart or peripheral circulation, and so is invaluable in the insomnia of cardiac disease. It has no effect on the kidneys, but is better avoided in renal disease on account of its constipating effect. Secretions generally tend to diminish, but as morphine dilates skin vessels the excretion of sweat is increased. For this reason Dover's Powder forms a common remedy in the treatment of catarrhs. Morphine diminishes metabolism, and is commonly used in the treatment of diabetes (see Codeina). Tolerance to morphine is caused by the greater ability of the tissues to oxidise the alkaloid. Acute morphine poisoning has to be distinguished from certain cerebral conditions, intoxication, concussion, and hæmorrhage; the equal pin-hole pupils which do not react to light form a valuable aid in diagnosis. Treatment of poisoning by morphine consists in washing out the stomach with dilute potassium permanganate solution two or three times at intervals of half an hour; by artificial respiration, inhalation of oxygen, and by the use of caffeine and other drugs which excite the respiratory centre. Children are especially susceptible to morphine, and it must be prescribed for them with the very greatest care. The pure alkaloid, morphine, is employed only when oily solutions are required; in other cases, the soluble salts are more conveniently dispensed. For the preparation of a solution in oil (almond, olive, or liquid paraffin), the alkaloid is usually dissolved in ten times its weight of oleic acid, and the oleate so formed mixed with the oily vehicle. Ointments containing 2 to 5 per cent. of morphine may be similarly prepared. Oleinatum Morphinæ contains 2 per cent. of the alkaloid; it is used with Oleinatum Hydrargyri to allay pain, or may itself be applied over painful areas, the oleic acid aiding absorption.

*Dose.*—6 to 30 milligrams ( $\frac{1}{10}$  to  $\frac{1}{2}$  grain).

*NOTE.*—Morphinated water is a saturated solution of the alkaloid, prepared by digesting pure morphine in chloroform water for seven days, at a temperature of  $15.5^{\circ}$ , with occasional agitation, and filtering from the undissolved morphine.

## MORPHINÆ ACETAS.

### MORPHINE ACETATE.



Morphine acetate,  $\text{C}_{17}\text{H}_{19}\text{NO}_3 \cdot \text{C}_2\text{H}_4\text{O}_2, 3\text{H}_2\text{O}$ , may be prepared by neutralising freshly precipitated morphine, diffused in water, with acetic acid, evaporating on a water-bath until the solution solidifies on cooling, and finally carefully drying the salt at a gentle heat, when it may be powdered. It cannot be dried without some little decomposition occurring, acetic acid being liberated.

It occurs as a white or yellowish-white amorphous or crystalline powder, having a faintly acetous odour especially when the vessel containing it is freshly opened. Samples which have been kept for any length of time become basic from loss of acetic acid, and

brownish in colour. It has a bitter taste. Soluble in water (1 in  $2\frac{1}{2}$ ), in alcohol (1 in 100), in glycerin (1 in 5), insoluble in ether. In making aqueous solutions a little free acetic acid is usually required to replace that lost during spontaneous decomposition. The alcoholic solution when mixed with ether deposits crystals of the base, free acetic acid remaining in solution. When heated, the salt loses water and acetic acid, and melts at about  $200^{\circ}$ . On ignition with free access of air it is completely consumed, leaving no residue (absence of mineral impurities). The addition of ammonia in slight excess to an aqueous solution throws out a precipitate of morphine which, when collected, washed with morphinated water, and dried, should respond to the reactions and tests given under *Morphina*, and should indicate 71 per cent. of anhydrous morphine. In neutral solutions ferric chloride produces a blue colour, which is destroyed by acids, alcohol, or by heating.

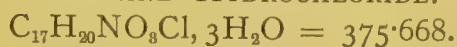
Morphine acetate has the general medicinal properties of the salts of morphine (see *Morphina*), but is not so much used as formerly, owing to the tendency both of the salt and its solutions to undergo change; the tartrate is now generally preferred. The acetate is employed in the preparation of the official *Liquor Morphinæ Acetatis*, a fairly stable solution which, however, darkens slightly in colour on keeping. Morphine acetate is incompatible with alkalies, alkaline earths, vegetable astringents, and salts of the heavy metals. Its antidotes are those of opium.

*Dose*.—8 to 30 milligrams ( $\frac{1}{8}$  to  $\frac{1}{2}$  grain).

*NOTE*.—Morphine acetate should be kept in well-stoppered, amber-coloured bottles.

## MORPHINÆ HYDROCHLORIDUM.

MORPHINE HYDROCHLORIDE.



*Synonyms*.—Hydrochlorate of Morphine; Muriate of Morphina.

Morphine hydrochloride,  $\text{C}_{17}\text{H}_{19}\text{NO}_8\text{HCl}, 3\text{H}_2\text{O}$ , may be prepared by neutralising pure morphine, suspended in hot water, with diluted hydrochloric acid, concentrating the solution, cooling, and setting it aside to crystallise.

It occurs in white, acicular crystals, or as a white, microcrystalline powder; odourless, and having a bitter taste. Soluble in cold water (1 in 24), in boiling water (1 in 1), in alcohol (1 in 50), in glycerin (1 in 8), insoluble in ether and in chloroform. Its aqueous solution is neutral to litmus paper. At  $100^{\circ}$  it loses its water of crystallisation, at  $250^{\circ}$  it becomes brown, then chars, but does not melt. On complete ignition it usually leaves a visible but not weighable residue. On adding ammonia to an aqueous solution of morphine, the base forms a crystalline precipitate which, when collected, washed, and dried, should respond to the tests given under *Morphina*. The precipitate formed in this way should not yield more than traces to benzene (absence of other alkaloids). It is an open question

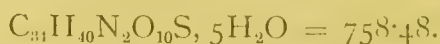
whether morphine dissolves in sulphuric acid with or without colour, some authorities maintaining that a pale rose colouration is produced. The method of applying the test may account for conflicting statements, as recent experiments have shown that, though a faint pink colouration occurs at first, the solution becomes colourless on shaking. An aqueous solution (1 in 30) to which potassium carbonate has been added should not impart any colour to chloroform (absence of apomorphine). It should respond to the identification tests described under *Morphina*. Assayed gravimetrically it should yield 75.5 per cent. of anhydrous morphine.

Morphine hydrochloride has the general medicinal properties of the salts of morphine (see *Morphina*). It is one of the most permanent salts of the alkaloid, and where its solubility admits, it is preferred to the salts of the organic acids. The official *Liquor Morphinae Hydrochloridi* is the most convenient preparation for general use in dispensing, 11 minims containing  $\frac{1}{10}$  grain of morphine hydrochloride. For use as mildly sedative and expectorant lozenges, *Trochiscus Morphinae* and *Trochiscus Morphinae et Ipecacuanhae* are suitable. Pastilles of morphine, morphine and cocaine, and morphine and bismuth are also prepared. *Suppositoria Morphinae* contain  $\frac{1}{4}$  grain of morphine hydrochloride in each; they are also used two, three, or four times this strength. Morphine hydrochloride is sometimes given in pills, prepared by triturating the alkaloidal salt with sugar of milk, and massing with syrup of glucose. *Linctus Sedativus* is a convenient preparation to allay incessant cough and produce sleep. Insufflations of morphine ( $\frac{1}{4}$  grain), with 1 grain of bismuth oxychloride or  $1\frac{1}{2}$  grains of starch are used for the throat and larynx: it is also a constituent of *Insufflatio Bismuthi et Morphinae* (Ferrier's Snuff), for use in nasal catarrh. Tablets of morphine hydrochloride are made in all strengths for the preparation of solutions for hypodermic use; the official *Injectio Morphinae Hypodermica* is, however, prepared with morphine tartrate. Morphine hydrochloride is incompatible with alkalies, alkaline earths, vegetable astringents, and salts of the heavy metals. Its antidotes are those of opium.

*Dose*.—8 to 30 milligrams ( $\frac{1}{8}$  to  $\frac{1}{2}$  grain).

## MORPHINÆ SULPHAS.

### MORPHINE SULPHATE.



Morphine sulphate,  $(\text{C}_{17}\text{H}_{19}\text{NO}_3)_2\text{H}_2\text{SO}_4, 5\text{H}_2\text{O}$ , may be prepared by neutralising pure morphine, suspended in hot water, with diluted sulphuric acid, concentrating the solution, cooling, and setting it aside to crystallise.

It occurs in white, acicular crystals, or in cubical masses; odourless, permanent in the air, and having a bitter taste. It loses three



molecules of water at  $100^{\circ}$ , and the remaining two molecules at  $130^{\circ}$ . Soluble in water (1 in 21), but only slightly soluble in alcohol (1 in 700); insoluble in ether or chloroform. The salt assumes a brown colour when heated to about  $250^{\circ}$ , and then chars without melting. On ignition it is consumed very slowly, and leaves no residue. Its solution is neutral to litmus paper, and yields, on the addition of ammonia, a precipitate which should respond to the tests for morphine.

Morphine sulphate has the general properties of the salts of morphine, and was formerly official. It is used in the form of *Liquor Morphinae Sulphatis*, but may also be given in pills containing 16 milligrams ( $\frac{1}{4}$  grain).

*Dose*.—8 to 32 milligrams ( $\frac{1}{8}$  to  $\frac{1}{2}$  grain).

### MORPHINÆ TARTRAS.

#### MORPHINE TARTRATE.



Morphine tartrate,  $(\text{C}_{17}\text{H}_{19}\text{NO}_3)_2\text{C}_4\text{H}_6\text{O}_6, 3\text{H}_2\text{O}$ , may be prepared by neutralising morphine suspended in water with tartaric acid, evaporating the solution at a gentle heat, and crystallising.

It occurs in white, acicular crystals, or as a white powder consisting of fine nodular tufts of minute, closely aggregated, acicular crystals; odourless, and having a bitter taste. Soluble in water (1 in 10), sparingly soluble in alcohol, almost insoluble in ether, chloroform, or carbon disulphide. It is a useful salt on account of its stability and ready solubility in water. Commercial samples have been found to contain variable proportions of the sparingly soluble acid tartrate. Morphine tartrate effloresces at  $20^{\circ}$ , and loses all its water of crystallisation at  $130^{\circ}$ . Its aqueous solution is not precipitated by caustic alkalies or carbonates. It should respond to the identification tests given under *Morphina*. Assayed gravimetrically 73.5 per cent. of anhydrous morphine should be indicated.

Morphine tartrate has the general properties of the salts of morphine, and is employed in the preparation of the official *Injectio Morphinae Hypodermica*, this salt having been substituted for the acetate on account of the greater stability of the tartrate. Tablets of morphine tartrate are made in various strengths for the preparation of solutions for hypodermic use. Atropine sulphate ( $\frac{1}{200}$  or  $\frac{1}{100}$  grain) is frequently added to morphine injections to increase their analgesic effect, to lessen their tendency to cause constipation, and especially to reduce spasm. The official *Liquor Morphinae Tartratis* contains  $\frac{1}{10}$  grain in 11 minims, and is used similarly to the corresponding solution of morphine hydrochloride. Morphine tartrate is incompatible with alkalies, alkaline earths, salts of the heavy metals and vegetable astringents. Its antidotes are those of opium.

*Dose*.—8 to 30 milligrams ( $\frac{1}{8}$  to  $\frac{1}{2}$  grain).

**MOSCHUS.****MUSK.**

Musk is the dried secretion from the preputial follicle of *Moschus moschiferus*, Linn. (Order Ungulata), a small deer widely distributed over the mountainous regions of Central Asia, especially in China and Thibet. The secretion is contained in a small sac situated immediately in front of the preputial orifice of the male deer. This sac is formed by an invagination of the skin, and produces on its inner surface alveoli, in which the secretion is formed, and from which it is discharged into the cavity of the sac; the latter opens by a small canal close to the preputial orifice. They are cut from the animal, trimmed, dried, and exported chiefly from Shanghai in small rectangular boxes known as "caddies." In London these are opened on arrival, and the pods examined, probed with a thin-bladed knife, and classified into "piles" according to their quality. After sale the pods are opened and the granular contents exposed to the air to dry, the ammoniacal odour which is often strongly marked being thus dissipated; in this way the grain musk of commerce is obtained. The best variety of musk is that known as Tonquin. It occurs in pods which are nearly circular, about 5 to 6.5 centimetres in diameter, about 2 centimetres thick; the lower surface, which is part of the hide of the animal, bears numerous brownish or brownish-white hairs surrounding a small, nearly central orifice. The upper surface is usually a thin, blue, iridescent skin ("blue skin" pods), but sometimes the tough, natural skin that originally covered this membrane has not been removed ("natural skin" pods). The pods weigh from 25 to 35 grammes, and contain about half that weight of musk.

Grain musk occurs in moist grains or granular masses, of a dark reddish-brown colour, penetrating odour, and slightly bitter taste. Water dissolves 50 to 75 per cent. of musk, alcohol only 10 to 12 per cent. It should not contain more than 15 per cent. of moisture, nor yield more than 8 per cent. of ash. Examined under the microscope it is seen to consist of irregular fragments and granules with oil globules, epithelial cells, and often the hyphæ of a fungus. Musk is very much adulterated, stone, shot, dried blood, resin, and various other substances having been used for this purpose. The amount and pale colour of the ash, the slight solubility in alcohol, the appearance under the microscope, and the aroma sufficiently indicate the purity.

The odorous principle of musk appears to be an oily liquid of ketonic nature, and has been termed muskone; it bears no relation whatever to artificial musk; the bitter taste is due to a resin. The drug also contains fatty matter, proteids, and inorganic substances.

Musk was formerly regarded as a powerful stimulant to the medulla; and good results have been obtained from its use in cases of collapse. There is, however, no evidence to show that it has any action other than that due to its odour. It has been used in the treatment of hysteria and other nervous manifestations, also in spasmodic asthma, and as a stimulant in pneumonia and bronchitis. Musk is best

administered in the form of a cachet, the drug being rubbed with a little sugar of milk; an emulsion may be prepared by triturating the musk with an equal quantity of acacia gum and sugar and adding water, or pills may be made by adding a little acacia gum and massing with syrup of glucose. Musk is sometimes given in the form of tincture. It is largely used in perfumery, and for this purpose an artificial substitute has lately been prepared; "artificial" musk, or trinitro-butyl-toluene, has been used in medicine in the form of tincture, in the treatment of whooping-cough.

*Dose*.—3 to 6 decigrams (5 to 18 grains). 10 grs

*NOTES*.—Yunnan musk is obtained from the Chinese province of that name. It is distinguished from the Tonquin by the pod being spherical or pear-shaped instead of flattened, and by the peculiar appearance of the depressed orifice, which, with the two small nipples near it, have given it the name of "pig-faced musk." It is almost equal in quality to Tonquin. Cabardine musk seldom reaches the London market; the pods are flatter and yellower, and inferior to the Tonquin. Some musk is also sent from Assam, most of it being imported in grains; the pods resemble Tonquin, but the hairs are longer, whiter, and coarser. Grain musk is also sent from Nepal *via* Calcutta; it is usually of inferior quality.

## MUCILAGO ACACIÆ.

### MUCILAGE OF ACACIA.

*Synonym*.—Mucilage of Gum Acacia.

Gum Acacia, in small pieces	...	...	...	40°00
Distilled Water, sufficient to produce by weight	...	...	...	100°00

Wash the gum by rinsing it quickly with a small quantity of the water, then dissolve it in 60 of distilled water, and strain, or filter through a plaited filter.

Mucilage of acacia is added to syrupy cough mixtures as a demulcent, but is principally employed in dispensing to suspend resinous tinctures and to prepare emulsions of oleoresins, fixed and volatile oils. In general, the amount of mucilage necessary to effect suspension of resinous substances is one-sixteenth of the bulk of finished mixture. The mucilage should be diluted with twice its volume of water and the resinous tincture or fluid extract added in small portions, shaking the whole after each addition. In some cases, mucilage of tragacanth answers better than mucilage of acacia, or a mixture of the two mucilages may give the best result (see the respective tinctures). When salts incompatible with acacia are present, tragacanth must be used. For the preparation of emulsions, mucilage of acacia must be perfectly fresh, otherwise it must be newly made in a mortar with the proper proportion of powdered gum. A general process is to place the mucilage in a mortar and add the oil in small portions, incorporating each portion thoroughly before adding more oil. When all the oil is emulsified, add water in small successive portions, making up to the required bulk. Mucilage of acacia should not be used to suspend insoluble powders, as it is prone to form with them indiffusible masses. Pills prepared therewith become hard and insoluble; as a pill-



excipient, it should be diluted with 2 parts of syrup of glucose. Mucilage of acacia is incompatible with strong alcohol, borax, ferric salts and lead subacetate.

*Dose*.—4 to 16 mls (1 to 4 fluid drachms).

*NOTES*.—Mucilage of acacia should be stored in small, full bottles in a cool place. It tends to become acid on keeping, and is then useless for the preparation of emulsions. The addition of a small proportion of solution of formaldehyde will preserve it unchanged for an indefinite period. Mucilago Acaciæ, U.S.P., is prepared by washing 34 of gum acacia with cold water, allowing it to drain, then adding 33 by weight of lime water, and sufficient plain water to make the product weigh 100.

### MUCILAGO ACACIÆ COMPOSITA.

#### COMPOUND MUCILAGE OF ACACIA.

*Synonym*.—Pill-coating Solution.

Gum Acacia, in powder	...	...	...	10·00
Tragacanth, in powder	...	...	...	2·50
Chloroform	...	...	...	0·50
Distilled Water, sufficient to produce	...	...	...	100·00

Mix the chloroform with the powders, and add sufficient distilled water to produce the required volume.

This mixture has been recommended for moistening pills previous to coating.

### MUCILAGO AMYLI.

#### MUCILAGE OF STARCH.

Starch	...	...	...	...	2·50
Distilled Water, cold	...	...	...	...	100·00

Rub the starch to a smooth paste with the water, and heat the mixture to boiling.

This mucilage is used as a basis for enemata.

### MUCILAGO CYDONIÆ.

#### MUCILAGE OF QUINCE.

Quince Seeds	...	...	...	...	4·00
Distilled Water	...	...	...	...	100·00

Macerate the seeds in the distilled water for three hours, with occasional stirring, and strain without expression.

This mucilage forms a useful suspending agent for such liquids as tincture of benzoin when added to toilet preparations.

*NOTE*.—This mucilage is sometimes prepared with rose water.

### MUCILAGO GUMMI INDICI.

#### MUCILAGE OF INDIAN GUM.

Indian Gum, in small pieces	...	...	...	25·00
Distilled Water, sufficient to produce, by weight	...	...	...	100·00

Wash the gum by rinsing it quickly with a small quantity of the water, then dissolve it in 75 of distilled water, and strain.

This mucilage is official in India and the Eastern Colonies, where it may be substituted for Mucilago Acaciæ in the official preparations, for which the latter is directed to be used. It is more viscous and glairy than mucilage of acacia.

**MUCILAGO LINI.**

## MUCILAGE OF LINSEED.

Linseed ... ..	12.50
Distilled Water, boiling ... ..	100.00

Infuse the linseed in the water for fifteen minutes, and strain.

This mucilage should be freshly prepared as required; it is used as an ingredient of cough mixtures and in the preparation of Trochisci Lini et Glycyrrhizæ et Chlorodini.

**MUCILAGO SASSAFRAS MEDULLÆ.**

## MUCILAGE OF SASSAFRAS PITH.

Sassafras Pith ... ..	2.00
Distilled Water... ..	100.00

Macerate the sassafras pith in the distilled water for three hours, and strain without expression. This mucilage should be freshly prepared as required.

This preparation is given in bronchial affections and intestinal disturbances, and has been applied locally for acute conjunctivitis.

*Dose.*—8 to 30 mls (2 to 8 fluid drachms).

**MUCILAGO TRAGACANTHÆ.**

## MUCILAGE OF TRAGACANTH.

Tragacanth, in powder ... ..	1.38
Alcohol ... ..	2.25
Distilled Water, sufficient to produce ... ..	100.00

Add the tragacanth to the alcohol, shake till the powder is thoroughly diffused, then add sufficient distilled water to produce the required volume, and shake vigorously.

Mucilage of tragacanth is employed in mixtures to suspend resinous tinctures (1 of mucilage to 7 of mixture), but with a few exceptions it is not so useful for this purpose as mucilage of acacia. The tragacanth mucilage is also used to suspend insoluble powders in mixtures, but like other gums it tends to make the deposit coherent and difficult of diffusion by shaking. It is used instead of mucilage of acacia when a suspending agent is required in face lotions and in lotions and mixtures containing salts incompatible with acacia.

*Dose.*—4 to 16 mls (1 to 4 fluid drachms).

*NOTE.*—Mucilago Tragacanthæ, U.S.P., is prepared by mixing 18 by weight of glycerin with 75 of water, heating the mixture to boiling, adding 6 of tragacanth, macerating for twenty-four hours with occasional stirring, adding sufficient water to make the product weigh 100, and straining forcibly through muslin.

**MUCILAGO ULMI FULVÆ.**

MUCILAGE OF SLIPPERY ELM.

*Synonyms.*—Mucilago Ulmi; Mucilage of Elm.

Slippery Elm, bruised ...	...	...	...	6.00
Distilled Water ...	...	...	...	100.00

Digest the slippery elm with the distilled water in a covered vessel on a water-bath for one hour, then strain. This mucilage should be freshly prepared as required.

This mucilage is used as a demulcent in the treatment of inflammatory affections of the respiratory, intestinal, and urinary tracts; it is also applied locally for the relief of erysipelas and other cutaneous inflammations.

*Dose.*—8 to 30 mils (2 to 8 fluid drachms).

**MUCUNA.**

COWHAGE.

*Synonym.*—Cowitch.

Cowhage consists of the hairs attached to the fruit of *Mucuna pruriens*, DC. (N.O. Leguminosæ), a climbing plant growing in Tropical Africa, India, and America. The fruit is a curved, blackish-brown legume, 5 to 10 centimetres long and 10 millimetres wide, containing four to six seeds, and covered with stiff, yellowish-brown hairs. These hairs detached from the fruit form the commercial drug.

The hairs are about 2 to 3 millimetres long, one-celled, thin-walled, and sharply pointed, and bear numerous minute recurved prominences. They contain either air or a brownish substance of tannoid nature. The drug has the appearance of a loose, yellowish-brown, felted mass of hairs, intermingled with occasional black fragments of the pericarp.

Cowhage was formerly employed as a vermifuge, its action in this respect being entirely mechanical, the sharp hairs penetrating the worm, and allowing its expulsion. The dose is mixed with honey or treacle, and taken on three or four successive mornings, followed finally by a dose of castor oil. An ointment of cowhage (1 in 60) has been used as an external irritant and rubefacient.

*Dose.*—6 to 40 decigrams (10 to 60 grains).

**MYLABRIS.**

MYLABRIS.

Mylabris is the dried beetle, *Mylabris phalerata*, Pallas (Order, Coleoptera), which is abundant in China and Eastern India.

The beetles are about 25 millimetres long and 9 millimetres broad; wing-cases black, with three broad, wavy, orange-yellow bands, which, when examined under a lens, are seen to bear black bristly hairs. The odour is disagreeable.

The chief constituent of mylabris is from 1 to 1.2 per cent. of cantharidin. The beetles also contain fat and an odorous principle.

*NOTES.*—*M. Cichorii*, which is often present in the drug, is smaller, and has brighter yellow bands, covered with a yellow downy pubescence, the hairs on the



back part being black. *Mylabris phalerata* is official in India and the African and Eastern Colonies, for use instead of cantharides, but other species of the genus *Mylabris* may be employed, provided the proportion of cantharidin yielded is equivalent to that contained in *M. phalerata*.

## MYRISTICA.

### NUTMEG.

*Synonym.*—NUX MOSCHATA.

Nutmeg is the dried seed, divested of its testa, of *Myristica fragrans*, Houtt. (N.O. Myristicaceæ), a tree indigenous to the Molucca Islands, and cultivated in Penang, Sumatra, the West Indies, etc. The fruit resembles a small peach, which as it ripens splits, and discloses the seed surrounded by a bright crimson reticulated arillus. This, stripped off and dried, constitutes mace, the colour changing to a dull reddish-yellow. The nutmeg is the kernel of the seed, and consists of a large whitish endosperm, covered by a thin, dark brown perisperm, which penetrates the endosperm by numerous infoldings, and produces the characteristic ruminant appearance of the section. The seeds are dried and the kernels freed from their thin shells, sorted and exported. Occasionally they are dipped in milk of lime, and again dried (limed nutmegs), a process which protects the seed from attack by insects. Arrived in this country nutmegs are again sorted; the broken and worm-eaten are rejected, and the sound ones graded according to their size. They are sometimes also limed to satisfy popular requirements.

The seeds are broadly ovoid in shape, and rarely exceed 2.5 centimetres in length. Externally they are dark brown in colour, and marked with reticulate furrows that correspond to the fibrovascular bundles in the perisperm. They have a strong, aromatic odour, and aromatic, slightly bitter taste.

The chief constituent of nutmegs is from 8 to 15 per cent. of volatile oil (see *Oleum Myristicæ*), and about 40 per cent. of solid fat, about three-fourths of which can be removed by hot pressure (see *Oleum Myristicæ Expressum*).

Nutmeg is aromatic, and carminative by virtue of its volatile oil. It is an ingredient of several official preparations for this purpose, and is used in culinary operations as an aromatic flavouring. The volatile oil is used in aperient pills and other preparations to prevent griping, and is given on sugar as a stimulant and carminative. *Spiritus Myristicæ* is employed similarly. The volatile oil is sometimes added to stimulating liniments for external use in chronic rheumatism, and the expressed oil was an ingredient of the hair lotion or wash prescribed by Sir Charles Locock, and known by his name. Nutmeg in large doses, like the essential oil of absinth, excites the motor cortex and produces a species of epileptiform convulsions.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

NOTES.—Penang nutmegs, which are the most esteemed, are broadly ovoid, and very aromatic. Singapore nutmegs closely resemble them, but are more deeply and minutely wrinkled, and frequently show marks of scorching. Wild nutmegs are longer, narrower, and less aromatic. Bombay nutmegs (*M. malabarica*, Lan.) are also longer and narrower, but are devoid of aroma. Of species of *Myristica* other than *M. fragrans*, only one, viz., *M. argentea*, Warburg, the Papua nutmeg, yields aromatic seeds; these are, however, like the preceding, longer, narrower, and less aromatic than the genuine. Factitious nutmegs have been made by pressing exhausted or crushed broken nutmegs together with mineral matter (clay) into moulds. They may be distinguished by the section, which is not regularly reticulated, as well as by the high yield of ash (11 to 18 per cent.), and low yield of volatile oil (1·76 per cent.). Good nutmegs should yield about 4 per cent. of ash. Mace is the dried arillus. It occurs in dull, pale reddish-yellow lobes, pieces which when soaked in water swell, and assume the shape of the nutmeg that yielded it. It contains from 4 to 15 per cent. of volatile oil, which is scarcely to be distinguished from that of the nutmeg. It also contains fat, amyloextrin, etc. Considerable quantities of valueless Bombay mace are imported. This is in elongated dark red pieces, divided into numerous very narrow lobes twisted together at the apex. It is further distinguished from genuine mace by its want of aroma, and by the amount of substances yielded to ether after exhaustion by petroleum spirit (30 per cent. as against 3·5 per cent. from genuine)

## MYROBALANUM.

### MYROBALANS.

Myrobalans are the dried immature fruits of *Terminalia Chebula* Retz. (N.O. Combretaceæ), a tree indigenous to India.

The fruits are black in colour, ovoid or fusiform in shape, about 8 to 13 millimetres long and 9 millimetres wide. They are much shrivelled longitudinally, hard and brittle; the fractured surface is shiny. The drug has no odour, but a very astringent taste.

The chief constituent of the immature fruits is from 20 to 30 per cent. of tannic acid; other constituents are gallic acid, free fatty acid, resins, glucose, a bitter principle, and colouring matter. The matured fruits, known as "chebulic myrobalans," are said to contain an organic acid, chebulinic acid, which splits up into tannic and gallic acids when heated with water.

Myrobalans are official in India and the Eastern Colonies as an equivalent of galls, the action of the drug being due to the tannin it contains.

*Dose*.—2 to 4 grammes (30 to 60 grains).

## MYRRHA.

### MYRRH.

Myrrh is a gum-resin obtained from the stem of *Balsamodendron Myrrha*, Nees. (N.O. Burseraceæ), and probably other species, shrubs growing in North-eastern Africa and Southern Arabia. When the stem is wounded a yellowish-white liquid exudes, which soon hardens to reddish-brown masses; these, collected in and exported from Somaliland, constitute the official drug.

It occurs in irregular or rounded tears, or in masses of agglutinated tears. Externally it is reddish-brown, rough, and often covered with a fine dust. Fracture brittle, the fractured surface granular, oily, and of a rich brown colour. Odour agreeable and aromatic; taste aromatic, bitter and acrid. Two mils of an ethereal solution (1 in 10) leaves on evaporation an oily film which is coloured at once deep violet-black by the vapour of bromine, or slowly violet by the vapour of nitric acid.

The chief constituents of myrrh are 25 to 40 per cent. of resin, 57 to 61 per cent. of gum, 2.5 to 8 per cent. of volatile oil, a bitter principle, and 3 to 4 per cent. of impurities. The resin consists of several amorphous indifferent constituents, which show little analogy with other resins. The volatile oil is yellow and rapidly resinifies when exposed to the air, producing resin similar to that contained in the myrrh itself. The volatile oil and the resins yield the same characteristic violet reaction. The gum is apparently allied to gum arabic, and, like it, is associated with an oxydase. The bitter principle has not yet been isolated. Good picked myrrh yields about 60 per cent. of substances insoluble in alcohol, and about 4 per cent. of ash. Commercial powdered myrrh is often of inferior quality, yielding as much as 13 per cent. of ash.

Myrrh is mildly disinfectant and is a local stimulant in chronic skin diseases. Internally, like the other resins, it is carminative, and during excretion acts as a mild expectorant, diaphoretic and diuretic. It is used for mouth washes and gargles in ulcerated or relaxed throat and spongy gums (1 part of *Tinctura Myrrhæ* or *Tinctura Myrrhæ et Boracis*, diluted with 16 parts of water). Myrrh is given with aloes and iron in anæmia and amenorrhœa, as in *Mistura Ferri Composita* and *Pilula Aloes et Ferri*; its emmenagogue action is more than doubtful. It is a common ingredient of tooth powders.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTES.—Myrrh as imported is always mixed with other gums and gum-resins, from which it is separated by picking. The oily granular surface, aromatic bitter taste and violet reaction with bromine sufficiently distinguish it, the admixtures being usually hard and uniform in fracture, sometimes vitreous, and with little taste, or with an acrid taste with the bitterness and aroma of myrrh. Bissabol (from *B. Erythræum*, var. *glabrescens*, Engl.) is imported separately and has been mistaken for myrrh; it is readily distinguished by the different odour, by the smaller and yellower tears, and by the negative result of the bromine test. African bdellium is hard and has a dull, slaty fracture, Indian bdellium occurs in irregular, dark, reddish-brown masses, devoid of the characteristic odour and taste. Opaque bdellium is yellow and opaque.

## NAPHTHALENUM.

NAPHTHALENE.

$C_{10}H_8 = 128.064$ .

*Synonym.*—Naphthalin.

Naphthalene,  $C_{10}H_8$ , is a hydrocarbon obtained by the distillation of coal tar; it is present in large quantity in the fraction obtained



between  $180^{\circ}$  and  $220^{\circ}$ , from which on cooling it separates in crystals. These crystals are freed from liquid by straining and pressure, washed successively with caustic soda solution and sulphuric acid, and finally purified by sublimation, or crystallisation from alcohol.

It occurs in colourless, transparent, crystalline, or micaceous scales, having a characteristic, tar-like odour, and a sharp aromatic taste. If quite pure it remains colourless. Insoluble in cold water, but water with which it has been boiled acquires a faint odour and taste; slightly soluble in cold alcohol, freely soluble in boiling alcohol, from which it separates on cooling; very soluble in ether, chloroform, carbon bisulphide, benzene, oil of turpentine, and in fixed and volatile oils, especially on heating; slightly soluble in glycerin. The alcoholic solution should be neutral to litmus paper. Melting-point,  $80^{\circ}$ ; boiling-point,  $218^{\circ}$ ; specific gravity, 1.15. It slowly volatilises on exposure to the air, rapidly when heated, and sublimes much below its melting-point. It burns with a smoky luminous flame, and on complete ignition it leaves no residue. It dissolves in warm concentrated sulphuric acid, forming a colourless solution. If impurities are present the solution acquires a pinkish tint, which becomes deeper if more than traces are present.

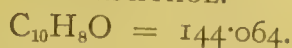
Naphthalene is employed as an antiseptic, but some doubt has been expressed as to whether it has itself such properties, or whether its antiseptic effects are due to the formation of naphthol. Its action closely resembles that of the naphthols (see Naphthol); it is partly oxidised in the tissues, and appears in the urine as alpha- and beta-naphthol and naphthoquinone, in combination with glycuronic and sulphuric acids. Large doses do not cause the symptoms usual with aromatic bodies, but produce a species of parenchymatous nephritis. Naphthalene is used internally in putrefactive diarrhoea as an intestinal disinfectant; it is also employed in the diarrhoea of phthisis and in typhoid fever and dysentery. It is a vermifuge for both tape and round worms. Externally, it is used as a parasiticide in scabies and to destroy pediculi, and also as a dusting powder for wounds and ulcers. Naphthalene is best administered enclosed in a cachet or in a gelatin capsule. Pills may also be prepared with syrup of glucose and a little compound powder of tragacanth. An ointment (10 per cent.) and a solution of a similar strength in olive oil are used for external application. Large doses of naphthalene, or prolonged use of the drug, may give rise to toxic symptoms.

*Dose.*—1 to 6 decigrams (2 to 10 grains).

*NOTES.*—A solution of naphthalene in hot alcohol produces, when poured into cold water, a fine precipitate of naphthalene (Naphthalenum Præcipitatum), which is less irritating for local application than the powdered crystals. Naphthalene is prepared in the form of balls, broken candles, tablets, etc., for use with or in place of camphor to keep away moths from articles of clothing, and is sold under the trade-names Alabastrine, Camphylene, and Albocarbon.

## NAPHTHOL.

NAPHTHOL.



*Synonyms.*—Betanaphthol; Beta-hydroxy-naphthalene.

Naphthol,  $\text{C}_{10}\text{H}_7\text{OH}$ , is isomeric with alpha-naphthol, and may be prepared in the same way, but at a higher temperature, viz.,  $200^{\circ}$ .

It occurs in colourless, crystalline laminæ or as a white or yellowish-white, crystalline powder having a slight phenolic odour, and a sharp, but not persistent taste. It acquires a pink colouration on keeping. Slightly soluble in cold water, more soluble in boiling-water; very soluble in boiling alcohol; easily soluble in ether, chloroform, solutions of sodium and potassium hydroxides, and in fatty oils. Melting-point,  $122^{\circ}$ ; boiling-point,  $286^{\circ}$ ; specific gravity,  $1\cdot217$ . It is freely volatile in steam; sublimes on heating, and should leave no residue on ignition. It should be neutral to litmus paper moistened with alcohol. On adding 1 drop of solution of ammonia to a hot saturated aqueous solution of naphthol a blue fluorescence is produced. Solution of chlorine added to a cold saturated aqueous solution gives a white turbidity which, on addition of excess of solution of ammonia, gives place to a green or brown colouration. If 1 decigram of naphthol be dissolved in 10 mils of boiling water and treated with 5 decimils of a 3 per cent. aqueous solution of ferric chloride, it gives a white precipitate, which becomes brown, but not violet (absence of  $\alpha$ -naphthol). Ferric chloride imparts a greenish colour to the cold aqueous solution, and chlorinated lime causes a pale yellow colouration, both reactions distinguishing it from  $\alpha$ -naphthol.

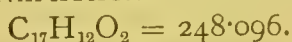
Naphthol is an antiseptic and germicide several times stronger than carbolic acid and much less toxic. In large doses, however, it produces toxic symptoms resembling those of carbolic acid, and it may give rise to irritation and inflammation of the kidneys, resulting in the presence of albumin, casts and hæmoglobin in the urine. It is excreted in combination with glycuronic acid, a small portion being oxidised, and giving to the urine a reddish tint. Naphthol is employed as an intestinal antiseptic in putrefactive diarrhœa, in enteric fever, and in the summer diarrhœa of children. It is also useful in fermentative dyspepsia and other gastric disorders. Externally, it is applied as a parasiticide in scabies, and as an antiseptic and stimulant in eczema and chronic skin diseases. Naphthol is usually administered enclosed in a cachet or capsule. Pills may be prepared with syrup of glucose and a small proportion of compound powder of tragacanth. It is applied externally in the form of ointment (see Unguentum Naphtholis) or in solution in olive oil, and is used as a medicated soap (2 or 5 per cent.). Naphthol, 1 part, combines with camphor, 2 parts, to form a viscid liquid (Naphthol Camphor) soluble in oils. It has been used as an injection for tuberculous glands with good results.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

NOTES.—*a*-Naphthol (hydroxy-naphthalene) may be prepared by heating naphthalene and sulphuric acid at a temperature of 60° to 80°, and fusing the sodium salt of the *a*-sulphonic acid formed, with sodium hydroxide. The sodium-naphthol thus obtained, on treatment with hydrochloric acid, yields *a*-naphthol, which may be purified by sublimation or by crystallisation from hot water or benzol. It occurs in colourless, shining needles, having an odour resembling that of phenol. Slightly soluble in cold water; readily in boiling water; very soluble in alcohol, ether, chloroform, and benzol. Melting-point, 96°; boiling-point, 278° to 280°; specific gravity, 1·224. It is freely volatile in steam; sublimes on heating, and leaves no residue on ignition. An aqueous solution gives with ferric chloride a milky precipitate, which afterwards becomes violet (*a*-Dinaphthol). Chlorine water produces a white precipitate, which dissolves in ammonia with a blue colour; chlorinated lime gives a dark violet. Heated at 150° with oxalic acid and sulphuric acid it produces a red precipitate—becoming green with ammonia and blue with alcoholic potash. If pine wood, moistened with an aqueous solution of *a*-naphthol and then with diluted hydrochloric acid, be exposed to sunlight, a green colouration is produced, finally becoming reddish-brown. Alpha-naphthol is more powerfully antiseptic than beta-naphthol, and is more poisonous. It is occasionally used as an intestinal injection (1 in 4000), and is sometimes prescribed in pills. Dose, 1 to 3 decigrams (2 to 5 grains). Sodium-naphthol (Microcidin) is readily soluble in water, and is used as an antiseptic lotion (1 in 200). A substance having properties similar to those of naphthol is sold under the trade-name Hydronaphthol.

### NAPHTHOLIS BENZOAS.

#### NAPHTHOL BENZOATE.



*Synonyms*.—Betanaphthol Benzoate; Benzonaphthol.

Naphthol benzoate,  $\text{C}_{10}\text{H}_7\text{C}_7\text{H}_5\text{O}_2$ , is formed by the interaction of  $\beta$ -naphthol and benzoyl chloride.

It occurs as a white, crystalline powder, tasteless, odourless; almost insoluble in water or ether, soluble in alcohol and chloroform. It dissolves in concentrated sulphuric acid, with a pale yellow colour, and the solution, diluted with about ten volumes of water and made alkaline with ammonia, develops a strong green fluorescence. Melting-point, 110°. In the intestines it splits up into  $\beta$ -naphthol and benzoic acid.

Naphthol benzoate is used as an intestinal antiseptic. It is best prescribed in cachets, which may also contain charcoal and the salts of bismuth. It may be administered in mixtures suspended with mucilage of acacia or tragacanth. It is decomposed in the intestines into  $\beta$ -naphthol and benzoic acid, the latter substance being absorbed and excreted as hippuric acid.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

### NAPHTHOLIS SALICYLAS.

#### NAPHTHOL SALICYLATE.



*Synonym*.—Betanaphthol Salicylate.

Naphthol salicylate,  $\text{C}_6\text{H}_4\text{OHCOOC}_{10}\text{H}_7$ , may be prepared by



heating together a mixture of  $\beta$ -naphthol-sodium, sodium salicylate and phosphorus oxychloride.

It occurs in small, white, shining crystals, or as a lustrous, crystalline powder, colourless, odourless, and tasteless. Insoluble in cold or hot water, soluble with difficulty in cold alcohol, freely soluble in boiling alcohol (1 in 3); also soluble in ether, benzol, and in warm linseed oil, but insoluble in glycerin. Its melting-point,  $95^{\circ}$ , serves to distinguish it from salol (phenyl salicylate), to which it is closely allied, the latter melting at  $43^{\circ}$ . On ignition it should leave no residue. A few drops of the alcoholic solution added to a very dilute solution of ferric chloride should produce no colouration (absence of free salicylic acid). It is unaffected in the cold by alkalis or acids, but when heated with these reagents in strong solutions it splits up into  $\beta$ -naphthol and salicylic acid. The same effect is produced by the alkaline pancreatic juice. On adding 1 decigram of the salt to 2 or 3 mils of sulphuric acid, a lemon-yellow solution should result in a very short time, which upon the addition of a trace of nitric acid changes to an olive-green (distinction from salol, which gives no such colouration). Shaken with 20 parts of boiling water the filtrate should be neutral (absence of salicylic acid, etc.), and no crystals should separate on cooling (absence of naphthol). It should be free from phosphates, sulphates, and chlorides.

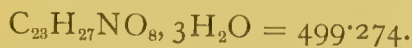
Naphthol salicylate has no action in the stomach, but, owing to its decomposition in the small intestine, exerts there the effects of naphthol and of salicylic acid. Its uses resemble those of salol, but its naphthol group is more powerfully antiseptic than the phenol group of salol, and is less prone to give rise to toxic symptoms. It is employed in cases of intestinal fermentation and less frequently in rheumatism and rheumatic manifestations. It is, however, rarely used. Naphthol salicylate is given in cachets with bismuth salicylate, or pills may be prepared with syrup of glucose and compound powder of tragacanth. It may also be given in mixture form suspended with almond mixture. Bougies containing one-fifth their weight of naphthol salicylate are used in gonorrhœa.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTES.—Naphthol salicylate is also known in commerce under the trade-names, Betol, Naphthalol, Naphthosalol, and Salinaphthol. The isomeric salicylate of alpha-naphthol is known as Alphol; its properties resemble those of beta-naphthol salicylate.

## NARCEINA.

### NARCEINE.



Narceine,  $\text{C}_{23}\text{H}_{27}\text{NO}_8, 3\text{H}_2\text{O}$ , is an alkaloid obtained from opium, by adding excess of sodium acetate to a solution of the opium bases in hydrochloric acid, and allowing to stand for twenty-four hours; the

filtrate evaporated to a small bulk on a water-bath deposits narceine on standing. It exists in opium to the extent of 0.1 to 0.2 per cent.

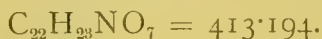
It occurs in white prisms, or fine, silky needles, inodorous, and having a slightly bitter taste. Slightly soluble in cold water, readily in hot water; slightly soluble in cold alcohol, readily in hot alcohol; insoluble in ether, and almost insoluble in chloroform, petroleum ether, and benzol; somewhat soluble in solution of ammonia, and in diluted solution of potassium hydroxide. Its solution in hot water is neutral and optically inactive. Melting-point,  $170^{\circ}$ ; the anhydrous base melts at  $140^{\circ}$  to  $145^{\circ}$ . On ignition it leaves no residue. Concentrated sulphuric acid dissolves it with a green-brown colouration, changing to cherry-red on standing, more quickly on warming. A mixture of solutions of potassium ferricyanide and ferric chloride is not immediately coloured blue by narceine (absence of morphine). With nitric acid it gives a rapidly fading, yellow colour. Very weak iodine solution (about 1 in 500) gives a dark blue colour. It is precipitated by solutions of iodine in potassium iodide, mercuric potassium iodide, bismuth potassium iodide, and tannic acid. With chlorine water, followed by ammonia, a blue-red colouration is produced. On adding diluted sulphuric acid to the solid narceine and concentrating on a water-bath a violet colouration is produced, changing to cherry-red on further heating; this, when cold, yields, on the addition of a trace of nitric acid or potassium nitrate, streaks of a blue-violet colour.

Narceine has a weak morphine-like action, but is not much used in medicine. It may be given in a pill as a mild hypnotic and to allay cough; it is less depressant than morphine and does not constipate.

*Dose.*—3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

## NARCOTINA.

### NARCOTINE.



*Synonym.*—Anarcotine.

Narcotine,  $\text{C}_{19}\text{H}_{14}(\text{OCH}_3)_3\text{NO}_4$ , is an alkaloid obtained from opium, in which it exists to the extent of 2 to 10 per cent. for the most part in the free state. It may be obtained directly from opium with ether, or extracted by digesting with diluted hydrochloric acid the residue left after exhausting opium with water; this solution is precipitated with sodium carbonate, the precipitate obtained boiled with alcohol, and the alcoholic solution concentrated and allowed to crystallise.

It occurs in the form of shining rhombic prisms, or long needles: colourless, odourless, and tasteless. Insoluble in water; soluble in ether, boiling alcohol, acetic ether, chloroform; soluble to some extent in benzol (distinction from morphine, which is quite insoluble); soluble in diluted acids; insoluble in cold, but soluble in boiling alkaline solutions. The acid solutions taste bitter, and are dextro-rotatory; the neutral solutions are laevo-rotatory. Melting-point,  $176^{\circ}$ .

At a higher temperature narcotine is decomposed with evolution of ammonia. On ignition it should leave no residue. With concentrated sulphuric acid the alkaloid dissolves with a greenish-yellow colour, which on warming becomes red, and on boiling, violet. Nitric acid produces a yellow-coloured solution. Concentrated sulphuric acid containing a trace of nitric acid produces a blood-red colour. If narcotine be shaken with a 5 per cent. solution of sodium hydroxide and filtered, the filtrate should not, on the addition of ammonium chloride, show a separation of crystals after twenty-four hours (absence of morphine). When shaken with a 2 per cent. solution of acetic acid (in which it is insoluble), and the mixture filtered, the filtrate on evaporation should not leave any residue (absence of the other alkaloids of opium).

Narcotine has little or no hypnotic action, and its name is in this respect entirely misleading. It has at first a mildly depressant action upon the cerebral hemispheres, which is followed by excitement due to stimulation of the spinal cord, producing restlessness and tremors with increased reflexes. Narcotine has been recommended for use as an antiperiodic in place of quinine in ague, but is rarely employed in medicine. It is much less poisonous than either morphine or codeine. Its chief significance depends on the fact that large amounts are present in some varieties of opium.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

## NEBULÆ.

### SPRAY SOLUTIONS.

Spray solutions are intended for the application of medicaments in solution to the throat and nose by means of a spray producer or atomiser. The solutions may be aqueous, oily, glycerinated, or alcoholic, and the spray coarse or fine.

#### **Nebula Acidi Tannici.** TANNIC ACID SPRAY.

Glycerin of Tannic Acid	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	100'00

Mix the liquids.

Tannic acid spray is used for relaxed sore throat.

#### **Nebula Adreninæ.** ADRENINE SPRAY.

Hydrochloric Solution of Adrenine	...	...	...	20'00
Chloroform Water (1 in 200), sufficient to produce	...	...	...	100'00

Mix the liquids.

Adrenine spray is used to spray the nasal passages in hay-fever and other inflammatory conditions, and also in epistaxis. It should be remembered that the vaso-constriction it causes is followed by reaction and vaso-dilatation.



**Nebula Adreninæ cum Cocaina.** ADRENINE SPRAY WITH COCAINE.

Hydrochloric Solution of Adrenine	...	...	20'00
Cocaine Hydrochloride...	...	...	2'00
Chloroform Water (1 in 200), sufficient to produce	...	...	100'00

Dissolve the cocaine hydrochloride in the chloroform water, and add the solution of adrenine.

This spray is used as a sedative and hæmostatic spray in inflammatory conditions of the nasal mucous membrane.

**Nebula Alkalina Composita.** COMPOUND ALKALINE SPRAY.

Sodium Bicarbonate	...	...	1'50
Borax	...	...	1'50
Carbolic Acid	...	...	0'75
Glycerin	...	...	25'00
Distilled Water, sufficient to produce	...	...	100'00

Dissolve the sodium bicarbonate, borax, and carbolic acid in 70 mls of distilled water, add the glycerin and sufficient distilled water to produce the required volume.

This spray is used for the nose and throat or as a nasal douche, in catarrh.

**Nebula Antiseptica Alkalina.** ANTISEPTIC ALKALINE SPRAY.

Sodium Bicarbonate	...	...	1'00
Borax	...	...	1'00
Sodium Benzoate	...	...	0'04
Sodium Salicylate	...	...	0'04
Eucalyptol	...	...	0'02
Thymol	...	...	0'02
Menthol	...	...	0'01
Oil of Gaultheria	...	...	0'01
Distilled Water, sufficient to produce	...	...	100'00

Triturate the solid ingredients with the eucalyptol and oil of gaultheria in a mortar, add the water, and dissolve without the aid of heat.

This spray is used for the throat and nose or as a nasal irrigation in catarrh.

**Nebula Benzoini Composita.** COMPOUND BENZOIN SPRAY.

Oil of Pine	...	...	1'50
Oil of Eucalyptus	...	...	3'00
Oil of Cassia	...	...	1'50
Menthol	...	...	1'00
Glycerin	...	...	50'00
Simple Tincture of Benzoin, sufficient to produce	...	...	100'00

Dissolve the menthol and oils in 50 mls of the tincture, then add the glycerin and sufficient tincture of benzoin to produce the required volume.

This preparation is used as a spray to the nose and throat in catarrhal affections of the respiratory passages.

**Nebula Benzoini Composita cum Cocaina et Quinina.** COMPOUND BENZOIN SPRAY WITH COCAINE AND QUININE.

Cocaine Hydrochloride	...	...	...	0·75
Camphor	...	...	...	3·00
Quinine Hydrobromide	...	...	...	6·00
Antipyrine	...	...	...	0·75
Compound Benzoin Spray	sufficient	to		
produce	...	...	...	100·00

Dissolve the solid ingredients in the liquid.

This spray is used as a sedative and antiseptic in hay fever and coryza.

**Nebula Eucalypti.** EUCALYPTUS SPRAY.

Oil of Eucalyptus	...	...	...	5·00
Liquid Paraffin, sufficient to produce	...			100·00

Mix the liquids.

Eucalyptus spray is used as an antiseptic for the throat and nose in dry catarrh.

NOTE.—This spray may also be made of other strengths, but is not usually made stronger than 15 per cent.

**Nebula Eucalypti et Mentholis et Cocainæ.** EUCALYPTUS, MENTHOL, AND COCAINE SPRAY.

Cocaine	...	...	...	...	0·50
Menthol	...	...	...	...	1·00
Oil of Eucalyptus	...	...	...	...	1·25
Camphor	...	...	...	...	1·00
Liquid Paraffin, sufficient to produce...	...				100·00

Reduce the cocaine to fine powder and dissolve with the menthol, eucalyptus oil, and camphor in the liquid paraffin.

This is a sedative and antiseptic spray for the throat and nose in catarrh and influenza, and occasionally to relieve coughing in asthma, bronchitis, and phthisis, and other conditions.

**Nebula Eucalypti et Pini.** EUCALYPTUS AND PINE SPRAY.

Oil of Eucalyptus	...	...	...	5·00
Oil of Pine	...	...	...	7·50
Liquid Paraffin, sufficient to produce...	...			100·00

Mix the liquids.

This is used as a mild stimulant and antiseptic in laryngitis and chronic bronchial catarrh.

**Nebula Ferri Perchloridi.** IRON PERCHLORIDE SPRAY.

Ferric Chloride	...	...	...	1·00
Distilled Water, sufficient to produce	...			100·00

Dissolve the ferric chloride in the distilled water.

This spray is a powerful astringent for use in relaxed and diphtheritic throats; it is also used to spray the nose in chronic rhinitis and as a styptic.

**Nebula Guaiacolis et Mentholis.** GUAIACOL AND MENTHOL SPRAY.

Guaiacol...	...	...	...	...	...	2'00
Menthol ...	...	...	...	...	...	4'00
Liquid Paraffin, sufficient to produce	...	...	...	...	...	100'00

Dissolve the guaiacol and menthol in the liquid paraffin.

This spray is employed as a disinfectant in tuberculosis, and also used to allay coughing.

**Nebula Iodi Composita.** COMPOUND IODINE SPRAY.

Iodine ...	...	...	...	...	...	1'00
Carbolic Acid ...	...	...	...	...	...	1'00
Liquid Paraffin, sufficient to produce	...	...	...	...	...	100'00

Dissolve the iodine in the liquid paraffin by the aid of heat, and add the carbolic acid.

This spray is used as a disinfectant in many conditions in ozæna, bronchitis, and nasal catarrh with purulent secretion.

**Nebula Iodi et Mentholis.** IODINE AND MENTHOL SPRAY.

Iodine ...	...	...	...	...	...	2'00
Menthol ...	...	...	...	...	...	4'00
Liquid Paraffin, sufficient to produce	...	...	...	...	...	100'00

Dissolve the iodine in the liquid paraffin by the aid of heat and add the menthol while the solution is warm.

This spray is used to check expectoration in chronic bronchitis and as a disinfectant in ozæna.

**Nebula Iodoformi.** IODOFORM SPRAY.

Iodoform ...	...	...	...	...	...	8'00
Ether, sufficient to produce	...	...	...	...	...	100'00

Dissolve the iodoform in the ether.

Iodoform spray is a powerful deodorant and detergent in rhinitis and ozæna.

**Nebula Mentholis.** MENTHOL SPRAY. *Synonym.*—Pigmentum Mentholis.

Menthol ...	...	...	...	...	...	5'00
Liquid Paraffin, sufficient to produce...	...	...	...	...	...	100'00

Dissolve the menthol in the liquid paraffin by the aid of gentle heat.

Menthol spray is used as an antiseptic in nasal catarrh, and to check excessive discharge.

**Nebula Mentholis Ætherea.** ETHEREAL MENTHOL SPRAY.

Menthol ...	...	...	...	...	...	4'00
Chloroform ...	...	...	...	...	...	40'00
Ether, sufficient to produce	...	...	...	...	...	100'00

Dissolve the menthol in the chloroform and ether.

This spray is used to produce temporary local anæsthesia.



**Nebula Mentholis Composita.** COMPOUND MENTHOL SPRAY.

Menthol ... ..	3'00
Cocaine Hydrochloride ... ..	0'50
Simple Tincture of Benzoin ... ..	50'00
Glycerin, sufficient to produce ... ..	100'00

Dissolve the menthol and cocaine hydrochloride in the tincture of benzoin, and add sufficient glycerin to produce the required volume.

This spray is used for its antiseptic and sedative properties in laryngitis, asthma, and bronchitis.

**Nebula Mentholis et Cocainæ.** MENTHOL AND COCAINE SPRAY.

Menthol ... ..	5'00
Cocaine ... ..	2'00
Almond Oil ... ..	25'00
Liquid Paraffin, sufficient to produce ... ..	100'00

Dissolve the powdered menthol and cocaine in the almond oil by the aid of gentle heat, and add sufficient liquid paraffin to produce the required volume.

This spray is used for the nose and throat in pharyngitis and catarrhal colds.

**Nebula Sodii Chloridi Composita.** COMPOUND SODIUM CHLORIDE SPRAY.

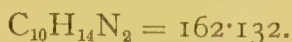
Sodium Bicarbonate ... ..	1'50
Sodium Chloride ... ..	0'75
Borax, in powder ... ..	1'50
Distilled Water, warm, sufficient to produce... ..	100'00

Dissolve in the warm distilled water.

This is used as a soothing spray for the throat and nose or as a nasal irrigation in chronic eustachian and nasal catarrh.

**NICOTINA.**

## NICOTINE.



Nicotine,  $\text{C}_{10}\text{H}_{14}\text{N}_2$ , is a liquid alkaloid which exists chiefly as malate in the leaves of *Nicotiana Tabacum*, Linne (N.O. Solanaceæ), the dried Virginian leaf sometimes containing as much as 7 per cent. It may be obtained by digesting the leaves in acidulated water, evaporating to a small bulk, and distilling with excess of potassium hydroxide; the distillate is shaken with ether, the ethereal solution distilled, and the residual nicotine placed in contact with quicklime to remove water, and finally distilled in a current of hydrogen.

It occurs as a colourless or yellowish oily liquid, very hygroscopic, and having an unpleasant, pungent, and acrid odour of stale, burnt tobacco. It gradually becomes brown in contact with the air, and is inflammable. In very dilute, aqueous solution it has a sharp, burning, and persistent taste. It is extremely poisonous, nearly

sixteen times more so than coniine. The free base is lævo-rotatory, the salts dextro-rotatory. Freely soluble in water, alcohol, ether, petroleum ether, terpenes, and the fixed oils. Its aqueous solution is alkaline, and turns red litmus blue, but does not redden phenolphthalein. Specific gravity, 1.01. Boiling-point,  $240^{\circ}$  to  $242^{\circ}$ . It remains liquid at  $-10^{\circ}$ , and volatilises readily and without decomposition in a current of steam. Applied to paper it leaves an oily stain, which gradually disappears. Concentrated sulphuric and nitric acids produce no colour in the cold. Five decimils of nicotine warmed with 15 decimils of water should give no turbidity (absence of coniine). It should also remain clear with twice its volume of ether. Potassium hydroxide separates it from its aqueous solution. Bromine added to a dilute aqueous solution forms a yellow flocculent precipitate. Chlorine colours it brown to blood-red. It is precipitated by most of the usual alkaloidal reagents. On adding an ethereal solution of iodine to an ethereal solution of nicotine, a brownish-red resinous precipitate falls. This gradually becomes crystalline, while from the supernatant liquid translucent ruby-red crystals with a blue opalescence separate. Oxidation with chromic acid mixture yields nicotinic acid, and this, when distilled with lime, yields pyridine.

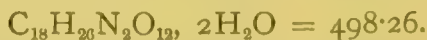
Nicotine first stimulates nerve cells and then paralyses them. It, therefore, at first raises blood pressure and later diminishes it. The paralytic action also results in a quicker heart, dilated bronchioles, and more active peristalsis, the latter from depression of the inhibitory fibres of the sympathetic. Nicotine is rarely used in medicine; it has been recommended for use in tetanus and as an antidote in strychnine poisoning. Preparations of nicotine are largely employed in horticulture as insecticides, usually by vaporisation. It is an extremely poisonous substance, and large doses may prove fatal within a few minutes, the symptoms being those of sudden paralysis of the central nervous system, including the respiratory centre. In cases of poisoning by nicotine the stomach should be evacuated, strong coffee and stimulants given, strychnine injected and warmth applied, the recumbent posture being maintained, and artificial respiration resorted to if necessary.

*Dose.*—1 to 6 centimils ( $\frac{1}{8}$  to 1 minim).

NOTES.—Nicotine salicylate (Eudermol) is employed as a parasiticide. It occurs in white or yellowish-white crystals, or as a crystalline powder, with a faint empyreumatic odour. It is soluble in water and in alcohol, but is used chiefly in the form of ointment (1 per cent.), prepared with lard, soft paraffin, or hydrous wool fat, for scabies and sycosis.

## NICOTINÆ TARTRAS.

### NICOTINE TARTRATE.



Nicotine tartrate,  $\text{C}_{10}\text{H}_{14}\text{N}_2(\text{C}_4\text{H}_6\text{O}_6)_2, 2\text{H}_2\text{O}$ , may be prepared by dissolving 10 of nicotine in an alcoholic solution of 18.5 of tartaric acid, and shaking out with ether; on evaporating

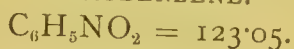
the ether, nicotine tartrate separates out as an oil. It may be crystallised from absolute alcohol containing ether.

It occurs in tufts of colourless or reddish-white crystals. Soluble in water.

*Dose*.—1 to 3 milligrams ( $\frac{1}{81}$  to  $\frac{1}{20}$  grain).

## NITROBENZENE.

NITROBENZENE.



*Synonyms*.—Nitrobenzol; Oil of Mirbane.

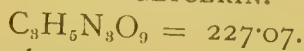
Nitrobenzene,  $\text{C}_6\text{H}_5\text{NO}_2$ , may be prepared by acting on benzene with a cold mixture of nitric and sulphuric acids, at a temperature of  $25^\circ$  to  $30^\circ$ . The product is washed with weak alkaline solution, and distilled in a current of steam.

It occurs as a pale yellow-coloured, oily liquid, having a very sweet taste, and an odour of bitter almonds. Slightly soluble in water; soluble in all proportions of alcohol, ether, benzol, and in oils. Boiling-point,  $206^\circ$  to  $209^\circ$ ; specific gravity, 1.187. It solidifies at a low temperature to acicular crystals, melting at  $3^\circ$ , and readily volatilises with steam. Treatment with sulphuric acid and zinc powder reduces it to aniline, and an alcoholic solution exposed to sunlight is similarly reduced. It is not attacked by chlorine or bromine in the cold. With boiling alcoholic solution of potassium hydroxide it forms azoxybenzene.

Nitrobenzene is used in perfumery and especially in soap-making as a substitute for essential oil of almonds. It is a powerful poison, causing great muscular weakness, a cyanotic colour of the skin, and rapid paralysis of the respiratory centre. These effects are due in part to met-hæmoglobin formation, and in part to central nervous action. In cases of poisoning the stomach should be evacuated, alcoholic stimulants given internally and strychnine injected hypodermically; artificial respiration must be employed if necessary. In those engaged in making explosives, and in other dangerous trades in which nitrobenzene is used, it is extremely difficult to determine the early stages of the disease, as it is not possible to detect met-hæmoglobin till from 5 and 10 per cent. is present in the blood.

## NITROGLYCERINUM.

NITROGLYCERIN.



*Synonyms*.—Trinitroglycerin; Trinitrin; Glyceryl Trinitras; Glyceryl Trinitrate; Glonoin.

Nitroglycerin,  $\text{C}_3\text{H}_5(\text{ONO}_2)_3$ , the nitric acid ester of glycerin, may be prepared by mixing nitric acid with twice its volume of sulphuric acid, and adding to the mixture, slowly and with constant stirring,



while kept at a temperature below  $26^{\circ}$ , one-seventh of its weight of dehydrated glycerin. The mixture thus obtained is slowly poured into a large volume of water. The liquid which settles to the bottom is washed with water containing a little alkali.

It occurs as a transparent yellow or yellowish (colourless when pure) oily liquid, odourless, and having a sweet, aromatic and pungent taste. If not quite free from water it is opaque. Specific gravity, 1.600. At  $8^{\circ}$  it solidifies. It is slightly volatile. Very slightly soluble in water; readily soluble in alcohol, ether, and chloroform; in almond oil (1 in 6). It decomposes on keeping. The alcoholic solution is precipitated by water. In contact with caustic alkalies it is decomposed. In the solid state it is dangerous to handle; explodes violently on percussion, and, under certain circumstances, spontaneously. While liquid, contact with flame neither inflames nor explodes it, but contact with red-hot iron does so. When absorbed by kieselguhr or other porous earth it constitutes the well-known explosive dynamite, in which state it is safe to handle. A 10 per cent. solution of nitroglycerin in alcohol is an article of commerce.

Nitroglycerin is given in the form of *Liquor Trinitrini*, to relieve dyspnoea of cardiac, pulmonary, or renal origin, and is especially valuable in angina pectoris. It is absorbed unaltered by the stomach, and is supposed to be converted into nitrite in the body (see *Liquor Trinitrini*).

*Dose*.— $\frac{1}{4}$  to 1 milligram ( $\frac{1}{200}$  to  $\frac{1}{50}$  grain).

## NUX VOMICA.

### NUX VOMICA.

*Nux vomica* consists of the dried, ripe seeds of *Strychnos Nux-vomica*, Linn. (N.O. Loganiaceæ), a small tree widely distributed over India and the Malay Archipelago. It produces a fruit resembling a large orange, which contains several seeds embedded in a whitish bitter pulp. The seeds are removed when ripe, cleansed, dried, and sorted. They are exported chiefly from Cochin, Madras, and other Indian ports.

The seeds have the shape of flattened discs from 2 to 2.5 centimetres in diameter and about 6 millimetres thick. They are densely covered with closely appressed satiny hairs radiating from the centre of the flattened sides, which give to the seeds a characteristic sheen. The seeds are very hard and consist of a copious, dark grey, horny endosperm in which the small embryo is embedded. They have no odour, but a very bitter taste. A section cut parallel to the radiating hairs exhibits the characteristic hairs and the cells of the endosperm with very thick walls; the former, which are strongly thickened and pitted at the base, are long and tubular, and bent near the base so as to lie close to the surface of the seed; the upper part of the hair bears longitudinal bar-like thickenings, which are lignified. The powdered drug is characterised by numerous fragments of the nearly transparent thick walled cells of the endosperm and fragments of the hairs; the latter are much disintegrated by the

pulverisation, the bar-like thickenings being mostly quite separated from one another.

*Nux vomica* contains the alkaloids strychnine and brucine, together with traces of strychnicine and of a glucoside, loganin. They also contain fatty matter (about 4 per cent.), caffeotannic acid, and a trace of copper. The total alkaloid present varies from 1·5 to 5·3 per cent., the average of seeds of good quality being 2·5 to 3·0 per cent. Of this total alkaloid about one-half is strychnine, although this proportion appears to be subject to some variation. Caffeotannic acid was formerly called igasuric acid. The fatty matter appears to be present chiefly as a secretion on the hairs, where it is present in a larger proportion than in the other parts of the seed.

The properties of *nux vomica* are virtually those of the alkaloid strychnine. The powdered seeds are employed in atonic dyspepsia, in cachet form, often with bismuth or pepsin. The official liquid extract of *nux vomica* is standardised to contain 1·5 per cent. of strychnine, and is used in the preparation of *Tinctura Nucis Vomicae* (0·25 per cent. of strychnine) and of *Extractum Nucis Vomicae* (5 per cent. of strychnine). The tincture is much employed in mixtures for its stimulant action on the gastro-intestinal tract. In the mouth it acts as a bitter, increasing the appetite. In the intestine it stimulates peristalsis and is often combined with laxatives such as cascara in chronic constipation due to atony of the bowel. Extract of *nux vomica* is very often used in pills in association with purgatives and with ferruginous preparations in anæmia.

*Dose*.—6 to 25 centigrammes (1 to 4 grains).

*NOTE*.—The pulp of *nux vomica* fruit contains about 5 per cent. of the glucoside loganin, together with the alkaloid strychnicine.

## OLEÆ FOLIA.

### OLIVE LEAVES.

Olive leaves are obtained from *Olea europæa*, Linn. (N.O. Oleaceæ), a tree which is widely cultivated in the countries bordering on the Mediterranean. The leaves are used both fresh and dried.

They are lanceolate or elliptic lanceolate in shape, from 4 to 8 centimetres long, very shortly stalked, with entire margin and mucronate apex. They are dark green above, paler and very minutely pitted below, and glabrous. The taste is feebly bitter and astringent.

The drug is said to contain a crystalline substance, vauquelin, together with a bitter acid principle, both of which substances require further investigation; they are reported to be contained in larger quantity in the young bark than in the leaves or old bark.

Olive leaves are used, in the form of extract and tincture, as a "tonic," febrifuge, and antiperiodic. A decoction (1 in 20) has also been employed as a substitute for quinine in the treatment of obstinate cases of fever.

**OLEINATUM ACONITINÆ.**

OLEINATE OF ACONITINE.

*Synonyms.*—Oleatum Aconitinæ; Oleate of Aconitine.

Aconitine ... .. 2'00

Oleic Acid, sufficient to produce, by weight... 100'00

Triturate the aconitine with a small quantity of the oleic acid in a warm mortar, then add the remainder of the oleic acid, previously warmed, and stir until the aconitine is dissolved.

Oleinate of aconitine is applied over the seat of pain in neuralgia, and in acute rheumatism. It must not be applied to abraded surfaces.

**OLEINATUM ATROPINÆ.**

OLEINATE OF ATROPINE.

*Synonyms.*—Oleatum Atropinæ; Oleate of Atropine.

Atropine ... .. 2'00

Alcohol ... .. 2'00

Oleic Acid, by weight ... .. 50'00

Olive Oil, sufficient to produce, by weight ... 100'00

Triturate the atropine with the alcohol in a tared mortar, add about an equal volume of oleic acid, warm the mortar, and stir until the alcohol has evaporated; then add the remainder of the oleic acid, stir until the atropine is dissolved, and add the olive oil.

Oleinate of atropine is readily absorbed by the skin, and is useful to paint on painful parts.

NOTE.—This preparation corresponds to Oleatum Atropinæ, U.S.P.

**OLEINATUM COCAINÆ.**

OLEINATE OF COCAINE.

*Synonyms.*—Oleatum Cocainæ; Oleate of Cocaine.

Cocaine ... .. 5'00

Alcohol ... .. 5'00

Oleic Acid, by weight ... .. 50'00

Olive Oil, sufficient to produce, by weight ... 100'00

Triturate the cocaine with the alcohol in a tared mortar, add about an equal volume of oleic acid, warm the mortar, and stir until the alcohol has evaporated; then add the remainder of the oleic acid, stir until the cocaine is dissolved, and add the olive oil.

Oleinate of cocaine is used to allay pain and irritation in neuralgia, eczema, and pruritus.

NOTE.—This preparation corresponds to Oleatum Cocainæ, U.S.P.

**OLEINATUM HYDRARGYRI.**

OLEINATE OF MERCURY.

*Synonyms.*—Oleatum Hydrargyri; Oleate of Mercury.

Yellow Mercuric Oxide ... .. 20'00

Ether (specific gravity, 0'720) ... .. 5'00

Oleic Acid, sufficient to produce, by weight... 100'00

Triturate the mercuric oxide with the ether in a tared mortar, stir in rapidly 80 by weight of oleic acid, warm the mortar to a tempera-



ture not exceeding  $50^{\circ}$  to evaporate the ether, and continue the trituration until the oxide is dissolved.

Oleinate of mercury is made of 20 per cent. strength, because its keeping properties are superior to those of the weaker solutions. Weaker preparations, containing 10 or 5 per cent., can be prepared by diluting the 20 per cent. oleinate with oleic acid. In dispensing, however, the 10 per cent. preparation is employed, unless otherwise ordered. It has properties resembling those of Hydrargyri Oleas, but is more readily absorbed, and is preferred by many practitioners, especially for application to ringworm, enlarged glands, and inflamed joints. It is used in the treatment of syphilis, by inunction, but is more irritating than Unguentum Hydrargyri, and possesses no advantages over the latter. The oleinate is sometimes prescribed with the addition of 1 or 2 per cent. of morphine; it must not be confused with Hydrargyri Oleas.

NOTES.—Oleatum Hydrargyri, B.P. 1885, was prepared by dissolving 1 of yellow mercuric oxide in 9 by weight of oleic acid, and contained a large excess of free acid. Oleatum Hydrargyri, U.S.P., is prepared by triturating 25 of yellow mercuric oxide with an equal weight of water in a tared mortar, adding 70 by weight of oleic acid, mixing thoroughly, warming the mortar to a temperature not exceeding  $50^{\circ}$ , stirring occasionally until the water has evaporated, and then adding sufficient oleic acid to produce 100 by weight.

## OLEINATUM MORPHINÆ.

### OLEINATE OF MORPHINE.

*Synonyms.*—Oleatum Morphinæ; Oleate of Morphine.

Morphine	...	...	...	...	2.00
Oleic Acid, sufficient to produce, by weight	...	...	...	...	100.00

Dissolve the morphine in the oleic acid.

Oleinate of morphine is readily absorbed by the skin, and is applied with a brush.

NOTE.—Oleum Morphinatum may be prepared by diluting this preparation with nine times its volume of almond oil.

## OLEINATUM QUININÆ.

### OLEINATE OF QUININE.

*Synonyms.*—Oleatum Quininæ; Oleate of Quinine.

Quinine	...	...	...	...	25.00
Oleic Acid, by weight	...	...	...	...	75.00

Triturate the quinine in a warm mortar with a small quantity of the oleic acid, until a smooth paste is formed; then add the remainder of the oleic acid, previously warmed, and stir until the quinine is dissolved.

Oleinate of quinine is readily absorbed by the skin, and is sometimes mixed with cod-liver oil, in the proportion of 5 decigrams to 30 mils (8 grains to 1 fluid ounce) for application, prior to treatment by X-rays.

NOTE.—This preparation corresponds to Oleatum Quininæ, U.S.P.

**OLEINATUM VERATRINÆ.****OLEINATE OF VERATRINE.**

*Synonyms.*—Oleatum Veratrinæ; Oleate of Veratrine.

Veratrine ... .. 2·00

Oleic Acid, by weight ... .. 50·00

Olive Oil, sufficient to produce, by weight ... 100·00

Triturate the veratrine with 5 of olive oil, warm gently, add the oleic acid, stir until the veratrine is dissolved, and add sufficient olive oil to produce the required weight.

Oleinate of veratrine is applied with a brush to allay pain in neuralgia; it is readily absorbed.

*NOTE.*—This preparation corresponds to Oleatum Veratrinæ, U.S.P.

**OLEORESINA CAPSICI.****OLEORESIN OF CAPSICUM.**

*Synonym.*—Capsicin.

Capsicum, in No. 40 powder ... .. 100·00

Acetone, a sufficient quantity.

Pack the powdered capsicum firmly in a suitable percolator and percolate slowly with the acetone, added in successive portions, until the percolate measures 160. Recover most of the acetone by distillation on a water-bath, transfer the residue to a dish, and allow the remainder of the acetone to evaporate spontaneously in a warm place. Pour off the liquid portion, transfer the remainder to a glass funnel fitted with a pledget of cotton wool, and when the separated fatty matter (which is to be rejected) has been completely drained, mix the liquid portions and preserve in a well-stoppered bottle.

Oleoresin of capsicum is used internally in pills in atonic dyspepsia as a gastric and intestinal stimulant. Externally, it is employed as Unguentum Oleoresinæ Capsici and as Emplastrum Capsici, for its powerful rubefacient and counter-irritant properties.

*Dose.*—30 milligrams ( $\frac{1}{2}$  grain).

*NOTE.*—Great care should be exercised in extracting this and other oleoresins with acetone, as the liquid is very volatile and inflammable.

**OLEORESINA CUBEÆ.****OLEORESIN OF CUBEBS.**

Cubebs, in coarse powder ... .. 100·00

Ether, a sufficient quantity.

Pack the cubebs closely in a percolator and pass ether slowly through the mass until the liquid passes colourless; then recover the ether by distillation, let the residue stand in a closed vessel until waxy or crystalline matter is no longer deposited, and decant the oleoresin.

Oleoresin of cubebs has the stimulant and diuretic properties of cubebs, and is given in gelatin capsules in cystitis, gonorrhœa, and gleet.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

NOTES.—Oleoresina Cubebæ was official in the British Pharmacopœia, 1885. It should be kept in a well-stoppered bottle. Oleoresina Cubebæ, U.S.P., is prepared by extracting cubebs, in No. 30 powder, with 95 per cent. alcohol.

### OLEORESINA LUPULINI.

#### OLEORESIN OF LUPULIN.

Lupulin ... .. 100·00  
Acetone, a sufficient quantity.

Exhaust the lupulin by slow percolation with acetone, recover most of the acetone by distillation on a water-bath, and allow the rest to evaporate spontaneously.

*Dose*.—1 to 3 decigrams (2 to 5 grains).

NOTES.—Oleoresin of lupulin should be kept in a well-stoppered bottle. See Note to Oleoresina Capsici.

### OLEORESINA PIPERIS.

#### OLEORESIN OF PEPPER.

Black Pepper, in No. 40 powder ... .. 100·00  
Acetone, a sufficient quantity.

Exhaust the pepper by slow percolation with acetone, recover most of the acetone by distillation on a water-bath, set the residue aside in a warm place until the remaining acetone has evaporated, and the deposition of crystals of piperine has ceased, then strain through cotton wool.

*Dose*.—15 to 45 milligrams ( $\frac{1}{4}$  to  $\frac{3}{4}$  grain).

NOTES.—Oleoresin of pepper should be kept in a well-stoppered bottle. See Note to Oleoresina Capsici.

### OLEORESINA ZINGIBERIS.

#### OLEORESIN OF GINGER.

*Synonym*.—Gingerin.

Ginger, in No. 60 powder ... .. 100·00  
Acetone, a sufficient quantity.

Moisten the ginger with 35 of acetone, and transfer as quickly as possible to a percolator with a closely fitting cover, pack tightly, and percolate slowly with acetone until exhaustion is complete. Recover most of the acetone from the percolate by distillation, and allow the remainder to evaporate spontaneously.

Oleoresin of ginger is employed in pills as an aromatic carminative and stimulant in dyspepsia and flatulence, and with purgative medicines to prevent griping.

*Dose*.—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

NOTES.—Oleoresina Zingiberis should be kept in a well-stoppered bottle. See Note to Oleoresina Capsici.



**OLEUM ADIPIS.****LARD OIL.**

Lard oil is a fixed oil obtained by subjecting lard to heavy pressure, without the application of heat.

It occurs as a colourless or pale yellow oily liquid having a peculiar odour and a bland taste. Almost insoluble in cold alcohol; slightly soluble in boiling alcohol; easily soluble in ether, chloroform, benzene, and carbon bisulphide. Specific gravity, 0.910 to 0.920 (0.905 to 0.915 at 25°). Exposed to a temperature somewhat below 10° it commences to deposit a white, granular fat, and becomes solid at 0°. Tested as described under *Oleum Olivæ* it should be free from cotton seed oil. It is completely saponifiable with alcoholic solution of potassium hydroxide, the resulting soap being entirely soluble in water (absence of mineral oils). Saponification value, 195 to 197. Iodine value, 56 to 74.

The oil does not consist of pure olein, but contains varying proportions of stearin, and is occasionally adulterated with liquid paraffin.

Lard oil is not employed in medicine, but it is sometimes used in the manufacture of pharmaceutical preparations.

**OLEUM AJOWAN.****OIL OF AJOWAN.**

*Synonym.*—*Ptychotis Oil.*

Oil of ajowan is obtained by distillation from the fruits of *Carum copticum*, Benth. and Hook. f. (N.O. Umbelliferæ), in which it exists to the extent of from 3 to 4 per cent. Indigenous to and cultivated in India.

It occurs as an almost colourless or brownish liquid, having the odour of thyme and a sharp burning taste. Specific gravity, 0.900 to 0.930. It is slightly dextro-rotatory.

The oil contains from 45 to 55 per cent. of thymol ( $C_{10}H_{14}O$ ), for which alone it is distilled in Europe. The thymol crystallises partially from the oil, complete separation being effected by shaking with solution of sodium hydrate to form thymol sodium, from which thymol is liberated by means of hydrochloric acid, and finally recrystallised from alcohol. The remainder of the oil consists of cymene ( $C_{10}H_{14}$ ), boiling at 175°, and a terpene boiling at 172°, the mixture being known commercially as "thymene."

Oil of ajowan is employed in India as an antiseptic and aromatic carminative. Its action and uses are similar to those of thymol.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

*NOTE.*—Ajowan oil is official in India and the Eastern Colonies as an equivalent of oils of anise, caraway, dill, and peppermint.

## OLEUM AMYGDALÆ.

## ALMOND OIL.

*Synonyms.*—Oleum Amygdalæ Expressum; Expressed Oil of Almond.

Almond oil is extracted by pressure from bitter or sweet almonds, in which it exists to the extent of about 40 per cent.

It occurs as a clear, pale yellow, almost odourless oily liquid, and has a bland, nutty taste. Slightly soluble in alcohol, more soluble in ether (1 in  $2\frac{1}{4}$ ), soluble in chloroform and benzene in all proportions. Specific gravity, 0.915 to 0.920 (0.910 to 0.915 at 25°). It should remain clear at a temperature of -10°, and should not congeal until it has been cooled to nearly -20° (absence of olive oil and lard oil). If 2 mils of the oil be well shaken with 1 mil of fuming nitric acid and 1 mil of water, a whitish mixture should be formed, which, after standing for six or eight hours at about 10°, should separate into a solid white mass and an almost colourless liquid (distinction from apricot kernel oil, which gives a red colour, or sesame and cotton seed oils, which give a brown colour). If 10 mils of the oil be mixed with 15 mils of a 15 per cent. solution of sodium hydroxide and 10 mils of alcohol, the mixture allowed to stand at a temperature of 35° to 40°, with occasional agitation, until clear, and then diluted with 100 mils of water, the clear solution thus obtained will, upon the subsequent addition of excess of hydrochloric acid, set free a layer of oleic acid, which, when separated, washed with warm water, and clarified by heating on a water-bath, will remain liquid if cooled to 15°. The fatty acid should also, on being mixed with an equal volume of alcohol (95 per cent.), yield a clear solution at 15°, and not deposit any fatty acids, nor become turbid on the further addition of one volume of alcohol (distinction from olive, arachis, cotton seed, sesame, and other fixed oils). The saponification value is from 191 to 200, and the iodine value from 95 to 100. A figure exceeding 105 may indicate adulteration with apricot kernel oil, which has a higher iodine value than almond oil, and is often substituted for it.

Almond oil consists chiefly of olein, with a small proportion of the glyceride of linolic acid and other glycerides; it contains no stearin.

It is a bland oil applied externally as an emollient for chapped hands and slight excoriations. It becomes rancid less readily than olive oil, and forms a whiter ointment with white wax and spermaceti; it is therefore preferred in the preparation of cold creams and similar toilet articles. It is the basis of many brilliantines and is added to lotions for the hair. Mixed with an equal quantity of lime water, one-eighth of its bulk of glycerin and a suitable perfume it forms "Glycerin and Lime Cream," a popular application for the hair. Internally, it is nutritive, demulcent, and laxative. An emulsion (1 in 8) may be prepared with acacia gum equal to one-fourth the weight of oil, for use as a simple cough mixture. 4 mils (1 fluid drachm) of the oil is a mild laxative dose for children.

*Dose.*—4 to 16 mils (1 to 4 fluid drachms).

**OLEUM AMYGDALÆ AMARÆ.**

OIL OF BITTER ALMOND.

*Synonym.*—Oleum Amygdalæ Essentiale sine Acido Prussico.

Oil of bitter almond is obtained by distilling the moistened, bitter almond cake from which the fixed oil has been extracted by pressure, and should be freed from hydrocyanic acid. A similar oil, found in commerce, is obtained from the seeds of the apricot (*Prunus Armeniaca*, Linn.). The oil does not pre-exist in the almond cake, but is formed by the interaction of two constituents, amygdalin and emulsin, the products of the reaction being benzaldehyde, hydrocyanic acid, and dextrose. Hydrocyanic acid may be present in the natural oil in dangerous amount (4 or 5 per cent.). To remove the hydrocyanic acid, the distilled oil is shaken with milk of lime and ferrous sulphate, whereby hydrocyanic acid is precipitated as calcium ferrocyanide; the unchanged benzaldehyde is then rectified by means of steam. In this way all traces of hydrocyanic acid are removed, and the oil may safely be used for any purpose. Another method of rectification is to shake the oil with a strong solution of sodium acid sulphite, which forms with the benzaldehyde a crystalline compound, from which the pure oil may be obtained by distilling with sodium carbonate.

It occurs as a colourless liquid, having a characteristic odour; optically inactive. Sparingly soluble in water; soluble in all proportions of alcohol, ether, fixed, and volatile oils. Nitric acid dissolves it at ordinary temperatures without generation of nitric oxide vapours. Specific gravity, 1.050 to 1.055 (1.045 to 1.060 at 25°). Boiling-point, 179°. On exposure to the air it is readily oxidised, and gradually deposits benzoic acid as a solid crystalline mass. The unpurified oil does not so readily deposit, the hydrocyanic acid present evidently acting as a preservative. If 5 decimils of the oil dissolved in a little alcohol be shaken with a few drops of a strong solution of sodium hydroxide, then a little ferrous sulphate, and, finally, mixed with a slight excess of hydrochloric acid, a blue precipitate should not be produced (absence of hydrocyanic acid). The presence of chlorine indicates contamination with or substitution by synthetically prepared benzaldehyde, although the latter, free from chlorine, has recently been placed on the market, so that the absence of chlorides is not an infallible indication of its purity. The following test may be applied to show the absence of chlorides:—Filter paper, free from chlorides, is moistened and placed on the inside of a large beaker. A folded strip of filter paper, saturated with the oil, is placed in a porcelain dish standing in a larger one, ignited, and immediately covered with the prepared beaker, which should be sufficiently large to cover the dish. The products of combustion are absorbed by the moistened paper, from which they are washed with distilled water, filtered, and treated with silver nitrate solution. No precipitate or even turbidity should be produced. To detect added nitrobenzol dissolve 1 mil of the sample



in 12 mils of absolute alcohol, and add 0.75 gramme potassium hydroxide; boil the liquid until it is reduced to about 4 mils, and leave it to cool. If the sample be pure no crystals form, but a brown colour is slowly developed, and the residual liquid is entirely soluble in water. In presence of nitrobenzol brown crystals of azoxybenzene,  $C_{12}H_{10}N_2O$ , are formed, which are insoluble in water, and may be collected, dried by pressure, and weighed.

Oil of bitter almond is employed as a flavouring agent for emulsions, and for use in domestic, culinary operations.

*Dose*.—1 to 6 centimils ( $\frac{1}{4}$  to 1 minim).

NOTES.—*Oleum Amygdalæ Amaræ*, U.S.P., contains from 2 to 4 per cent. of hydrocyanic acid, and not less than 85 per cent. of benzaldehyde. Most of the essential oil of almonds of commerce is obtained from apricot kernels, which are imported in large quantities from Syria and California. When treated in the same way as bitter almonds, the kernels yield about 35 per cent. of fixed oil (*Oleum Amygdalæ Persicum*), and about 0.6 to 1.0 per cent. of essential oil.

## OLEUM ANETHI.

### OIL OF DILL.

Oil of dill is obtained by distillation from the fruit of the dill, *Peucedanum graveolens*, Benth. and Hook. f. (N.O. Umbelliferae), a plant indigenous to the Caucasus and Mediterranean countries, but cultivated in Bavaria, Roumania, and many other places.

It occurs as a colourless liquid, soon becoming yellow on keeping, having an odour resembling that of caraway oil, and a taste at first mild, but afterwards sharp and burning. Soluble in 80 per cent. alcohol (1 in 5 to 8), forming a clear solution. Specific gravity, 0.905 to 0.915. A lower figure than 0.905 may indicate abstraction of carvone. Rotation,  $+75^{\circ}$  to  $+80^{\circ}$ .

The chief constituent of the oil is carvone (carvol),  $C_{10}H_{14}O$ , which is present to the extent of 40 to 60 per cent., and is identical with the carvone from caraway oil (q.v.). Another constituent in considerable quantity is limonene,  $C_{10}H_{16}$ , besides phellandrene,  $C_{10}H_{16}$ , and other terpenes, and a paraffin hydrocarbon. Although dill oil and caraway oil are almost identical in composition the former contains less carvone than the latter. The oil does not contain anethol. Adulteration is best detected by physical methods. Not more than 15 per cent. should distil below  $185^{\circ}$ , and not less than 40 per cent. above  $220^{\circ}$ . The English oil is considered the finest. The oil obtained from the East Indian dill fruit (*Peucedanum Sowa*, Kurz.) is not identical with that of *Peucedanum graveolens*, Benth. and Hook. f. Dill apiol is found in the East Indian oil, but does not occur in German distilled oil (see under Apiol). Indian dill oil is distinguished by its lower rotation ( $+41^{\circ}$  to  $+47^{\circ}$ ), by its higher specific gravity (0.948 to 0.970), and by its containing dill apiol, which boils at  $285^{\circ}$  and sinks in water; genuine dill oil contains no constituent boiling at so high a temperature, and no portion of the distillate sinks in water.

Oil of dill is employed as an aromatic carminative and stimulant especially in the flatulence of infants.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM ANISI.

### OIL OF ANISE.

Oil of anise is obtained by distillation from the fruit of *Pimpinella Anisum*, Linn. (N.O. Umbelliferæ), cultivated in nearly all parts of the world, and from the star anise, *Illicium verum*, Hook. f. (N.O. Magnoliaceæ), indigenous and cultivated in Southern China and Tonkin. The greater part of the commercial oil comes from the latter plant.

It occurs as a colourless or pale yellow, highly refractive liquid, having a characteristic aromatic odour and a sweet aromatic taste. It solidifies, at  $15^{\circ}$  to  $19^{\circ}$ , to a white crystalline mass. Soluble in alcohol (1 in 3), the solubility being much increased by rise in temperature. The presence of 5 per cent. petroleum, however, diminishes the solubility to 1 in 10 or more. Specific gravity, 0.980 to 0.990 (0.975 to 0.985 at  $25^{\circ}$ ). Rotation,  $0^{\circ}$  to  $-2^{\circ}$ ; never dextro-rotatory. The oil can be cooled considerably below its freezing-point without becoming solid, and can be kept so for a long time if undisturbed, but slight agitation, or the introduction of a minute crystal of anethol, sets up immediate solidification of the entire mass. Exposure to the air causes polymerisation and oxidation, with formation of anisic aldehyde,  $C_8H_8O_2$ , and anisic acid; the solidifying point becomes lowered, the specific gravity increases and the oil becomes more soluble in alcohol.

The characteristic properties of the oil are due to anethol,  $C_{10}H_{12}O$ , solid at ordinary temperatures, and present to the extent of 80 to 90 per cent. It occurs in the form of white, crystalline laminae, melting at  $21^{\circ}$  to a colourless refractive liquid, optically inactive, and having the pure characteristic odour and taste of anise. Specific gravity, 0.986 at  $25^{\circ}$ . Boiling-point,  $232^{\circ}$ . Another constituent is methyl chavicol, isomeric with anethol, a liquid optically inactive, having the odour but not the sweet taste of anise. These two constituents, together with traces of oxidation products, anisic aldehyde and anisic acid, are the only constituents of proved identity in the pimpinella oil. In the star-anise, however, d-pinene, l-phellandrene, the ethyl ester of hydroquinone, and probably safrol occur besides those already mentioned. The oil is subject to much adulteration, especially with petroleum, also with fennel oil, the liquid portion of the oil obtained in the manufacture of anethol, turpentine oil, alcohol, fatty oil. The best criterion of purity is the solidification point, which is usually about  $17^{\circ}$ , and the absence of even the slightest dextro-rotation. It is said that the two oils may be distinguished by treating with a saturated solution of hydrochloric acid gas in absolute alcohol, the oil of *P. Anisum* yielding a blue

colouration, and that of *Illicium verum* a yellow to brownish colour, but the test does not appear to be entirely satisfactory. The oils differ slightly in odour.

Oil of anise is employed as an aromatic carminative to relieve flatulence. The oil may be given on sugar or as Spiritus Anisi. It is a mild expectorant, and is an ingredient of simple cough lozenges, often in combination with liquorice. As a flavouring agent it is combined with the oils of gaultheria and peppermint in aromatic mouth-washes.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

### OLEUM ANTHEMIDIS.

#### OIL OF CHAMOMILE.

Oil of chamomile is obtained by distillation from the recently dried flowers of Roman chamomile, *Anthemis nobilis*, Linn. (N.O. Compositæ), cultivated in Europe and America.

It occurs, when freshly distilled, as a blue liquid, becoming greenish and brownish-yellow under the influence of air and light, having a strong but pleasant aromatic odour, and a burning taste. Soluble in alcohol (10 in 3), and forming a clear solution with 6 parts of 70 per cent. alcohol. It has a faint acid reaction. Specific gravity, 0.905 to 0.915. Rotation,  $+1^{\circ}$  to  $+3^{\circ}$ . Saponification number, 250 to 300.

The oil consists chiefly of a mixture of esters of angelic and tiglic acids (two isomeric acids of the formula  $C_5H_8O_2$ ) with butyl and amyl alcohol, and of butyric acid; it also contains an alcohol, anthemol,  $C_{10}H_{16}O$ , and a hydrocarbon, anthemene,  $C_{18}H_{36}$ , which forms crystalline needles melting at  $63^{\circ}$ . The body which causes the blue colouration of the freshly distilled oil has not been identified. The German oil from *Matricaria Chamomilla*, Linn. (N.O. Compositæ), has a specific gravity 0.903 to 0.940, and solidifies at  $0^{\circ}$ .

Oil of chamomile is employed for its aromatic carminative action on the stomach and with purgative medicines to prevent griping. Pills containing 1 minim of the oil in each may be prepared by adding a little soap to the oil.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

### OLEUM ARACHIS.

#### ARACHIS OIL.

*Synonyms*.—Oleum Nucis; Nut Oil; Earthnut, Groundnut, or Peanut Oil.

Arachis oil is obtained by expression without heat from the seeds of *Arachis hypogæa*, Linn. (N.O. Leguminosæ), a native of Africa, cultivated in West Africa, India, China, and America. The seeds contain 43 to 45 per cent. of the fixed oil.

It occurs as a pale yellow or greenish-yellow liquid, having a faint



nutty odour, and bland nutty taste. Soluble in ether and chloroform, insoluble in alcohol. Specific gravity, 0·916 to 0·918. It becomes turbid at 3°, and solid at -5°. Iodine value, 90 to 100; saponification value, 185 to 195; melting-point of mixed fatty acids, 28° to 30°. On exposure the oil thickens very slowly, and becomes rancid.

The chief constituent of arachis oil is olein, but the oil also contains the glycerides of arachidic, hypogæic, lignoceric, and linolic acids, while the "stearine" which separates from it at low temperatures contains arachin. Bleached arachis oil is manufactured in France, is nearly colourless, and almost free from taste; it has been used for adulterating lard oil and olive oil. The oil saponifies slowly, but yields a firm white soap with very little odour.

Arachis oil is official in India, the African, Eastern, and Australasian Colonies, where it may be used as a substitute for olive oil in making ointments, liniments, and plasters.

## OLEUM AURANTII.

### OIL OF ORANGE.

*Synonyms.*—Oleum Aurantii Corticis; Oil of Orange Peel.

Oil of orange is obtained by mechanical means from the fresh peel of the sweet orange, *Citrus Aurantium*, Linn., and also the bitter orange, *Citrus Aurantium* var. *Bigaradia*, Hook. f. (N.O. Rutaceæ), chiefly in Calabria and Eastern Sicily. By far the greater part of the oil of commerce is obtained from the sweet orange, but chemically the two oils are practically identical. It is possible, however, to distinguish them by odour and taste. The bitter is said to be the finer oil.

It occurs as a yellow to yellowish-brown liquid, having the characteristic odour of orange and a mild aromatic taste, bitter in the case of the bitter oil. It deteriorates on keeping, acquiring a disagreeable terebinthinate taste. The addition of 10 per cent. absolute alcohol to the fresh oil prevents this. It has a neutral reaction. Soluble in alcohol (1 in 7), in all proportions of absolute alcohol, but not always with formation of bright solutions, on account of the presence of waxy, non-volatile substances. Specific gravity, 0·848 to 0·852 (0·842 to 0·846 at 25°). Rotation, +96° (+92° in the case of the bitter oil) to +98° at 20°. Begins to boil at 175°, about 90 per cent. distilling over below 180°.

The oil consists of at least 90 per cent. of the terpene d-limonene,  $C_{10}H_{16}$ . Other constituents are citral, citronellal, the methyl ester of anthranilic acid, and a stearopten of which nothing, so far, is known. The physical constants are so balanced that the addition of any of the common adulterants is very easily detected. The waste terpene, however, obtained in the manufacture of terpeneless oil of orange is very difficult to detect, paleness of colour and harshness of odour being almost the only means of doing so. Oil of turpentine and oil of lemon are detected by the rotation. Alcohol

lowers the specific gravity. Fractionation would detect both turpentine and alcohol. The first 10 per cent. distilled from the oil should give a rotatory power not very different from that of the original oil. The purity of the oil is best judged by the rotation and odour. Distilled oil of orange is an inferior article, the effect of heat and steam being detrimental to the oxygenated compounds, which are of a very delicate nature.

Oil of orange is employed in perfumery, and in the form of Elixir Aurantii as a flavouring agent for mixtures.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

### OLEUM BERGAMOTTÆ.

#### OIL OF BERGAMOT.

Oil of bergamot is obtained from the fresh peel of the fruit of *Citrus Bergamia*, Risso. (N.O. Rutaceæ), a plant of which the botanical origin is obscure, cultivated mostly in Southern Calabria.

It occurs as a greenish or brownish-yellow liquid having a pleasant odour, and a bitter and very unpleasant taste. The green colour of the oil is due to chlorophyll, not to copper as frequently stated. Soluble in about a fourth to half of its volume of alcohol, the solution not becoming turbid on the further addition of alcohol. Soluble also in twice its volume of 80 per cent. alcohol, though not always with perfectly clear solution. Specific gravity, 0.882 to 0.886; rotation  $+8^{\circ}$  to  $+20^{\circ}$ .

The oil, on keeping, deposits a crystalline magma (5 or 6 per cent.) of bergaptene ( $C_{12}H_8O_4$ ), a non-volatile substance, which is inodorous at ordinary temperatures, but gives off aromatic vapours on heating, and melts at  $188^{\circ}$ . Other constituents are the ester, linalyl acetate,  $C_{12}H_{20}O_2$ , which is the chief source of the fragrance of the oil. The amount of this body is a guide to the value of the oil; it should be present to the extent of 35 to 40 or even 45 per cent. Besides this ester there is usually about 6 per cent. of free l-linalool ( $C_{10}H_{18}O$ ), d-limonene, dipentene, pinene, camphene, octylene, and acetic acid. The ester content is determined by saponification in the usual way. The oil is sometimes rectified, but it suffers in consequence, the ester being partially decomposed. Adulteration of oil of bergamot is very easily detected by changes in the physical constants. Oil of turpentine diminishes the specific gravity, fatty oils, cedar wood oil, and gurjun oil increase it; lemon and orange oils increase the rotation, and decrease the specific gravity, ester content, and solubility. Fatty oils also decrease the solubility and increase the amount of residue on evaporation. This residue is normally 5 to 6 per cent., and would be lessened by adulteration with oil of turpentine, oil of orange, or rectified bergamot oil.

Oil of bergamot is largely employed in perfumery, especially in oils and pomades for the hair; in pharmacy it is used to disguise disagreeable odours and to perfume ointments.

**OLEUM BETULÆ.**

## OIL OF BETULA.

*Synonyms.*—Oleum Betulæ Volatile ; Oil of Sweet Birch.

Oil of betula obtained by maceration and distillation from the bark of the sweet, black, or cherry birch, *Betula lenta*, Linn. (N.O. Betulaceæ). It does not pre-exist in the bark, but is formed by the interaction of the glucoside gaultherin, and a ferment, betulase.

It occurs as a colourless or yellowish liquid, having a characteristic odour and taste distinctly different from that of the otherwise nearly identical oil of gaultheria. Specific gravity, 1·175 to 1·185. Boiling-point, 218° to 221°. Optically inactive, thus differing from oil of gaultheria, which is slightly lævo-rotatory.

The oil may contain 99·8 per cent. of methyl salicylate, which can be determined by isolating and weighing the salicylic acid or by titration; a good oil should contain at least 98 per cent. of methyl salicylate. It agrees generally with the other tests and reactions given under Oleum Gaultheriæ and Methyl Salicylas. Oil of betula and oil of gaultheria are the heaviest oils known, and adulteration with foreign oils causes a lowering of the specific gravity, and lessens the solubility.

Oil of betula has properties resembling those of oil of gaultheria, and is used for the same purposes.

*Dose.*— $\frac{1}{2}$  to 1 mil (8 to 15 minims).

**OLEUM BETULÆ ALBÆ.**

## OIL OF WHITE BIRCH.

*Synonyms.*—Birch Tar; Birch Tar Oil; Oleum Rusci; Oleum Rusci Pyroligneum; Oleum Betulæ Pyroligneum.

Oil of white birch is prepared in Russia by the destructive distillation of the wood and bark of *Betula alba*, Linn. (N.O. Betulaceæ). Russian leather owes its characteristic odour to the above oil, which is used in its preparation.

It occurs as a thick liquid, resembling wood tar in colour, and having a peculiar, agreeable, penetrating odour. Soluble in oils, fats, and chloroform; partially soluble in alcohol. Specific gravity, 0·926 to 0·945 at 20°. The oil does not harden on exposure to the air. It can be distinguished from other varieties of tar, which may be substituted for it, by the following test:—Shake a few drops of the tar with water, and filter. The solution thus obtained will give a pink colouration with potassium cyanide solution, intensified on the addition of ammonia. No such reaction is obtained in the case of the Dutch and German varieties. The aqueous solution, obtained by shaking 1 part with 10 parts of water, is almost colourless, and has an acid reaction. With this solution a trace of ferric chloride produces a green colour. Five mils of the aqueous solution with 2 or 3 drops of aniline, and about 5 drops of hydrochloric acid give a yellow mixture. If adulterated



with fir tar or other kinds a red mixture is obtained. Shaken with twenty volumes of benzol, the latter assumes only a pale yellow colour. This benzol solution, on being shaken with a weak aqueous solution (about 1 in 1000) of copper acetate, should not assume a greenish colour (absence of fir tar).

The oil of white birch contains, amongst other constituents, guaiacol, cresol, and pyrocatechin ( $C_6H_6O_2$ ).

Oil of white birch resembles juniper tar oil in its properties, and is used for external application in the form of ointment (10 per cent.) or soap (10 per cent.) for eczema, psoriasis, and other skin affections.

### OLEUM CADINUM.

OIL OF CADE.

*Synonyms.*—Juniper Tar Oil; Huile de Cade.

Oil of cade is an empyreumatic, oily liquid obtained by the destructive distillation of the branches and wood of *Juniperus Oxycedrus*, Linn., and some allied species (N.O. Coniferæ), in Southern France.

It occurs as a dark reddish-brown or nearly black, more or less viscid, oily liquid, with a not unpleasant, empyreumatic odour, and an aromatic and bitter, acrid taste. Soluble in ether and in aniline; partially soluble in petroleum ether, chloroform, carbon bisulphide, and cold alcohol; almost wholly soluble in hot alcohol, scarcely soluble in water, but imparting its odour and an acid reaction to it, and forming an almost colourless solution; soluble in glacial acetic acid. Specific gravity, about 0.990. Acidity, in terms of acetic acid, about 1 per cent. Shaken with warm water, cooled, and filtered, the filtrate reduces ammoniacal solution of silver nitrate in the cold, and alkaline copper solution on heating. The aqueous solution gives with ferric chloride solution (1 in 1000) a red colouration.

The oil contains a high percentage of cadinene,  $C_{15}H_{24}$ , the best known representative of the sesquiterpenes, which is widely distributed among the volatile oils. It is lævogyrate, and forms a well-crystallised dihydrochloride, from which the hydrocarbon may be regenerated by heating with aniline or sodium acetate and glacial acetic acid. Specific gravity, 0.918 at 20°. Boiling-point, 274° to 275°. Rotation,  $-98.6^\circ$ . On dissolving it in glacial acetic acid and treating the solution with a little concentrated sulphuric acid a green colouration is at first produced, soon changing through blue to red. This is a characteristic colour test. Oil of cade is largely adulterated with or replaced by coal tar oil or wood tar oil. As true cade oil contains no furfural or catechol the presence of these bodies would point to adulteration with the tars mentioned. Furfural may be detected by adding a few drops of aniline to the aqueous filtrate of the oil; if present, an immediate bright red colouration is obtained; in the case of pure cade oil the mixture is at first colourless, and, on agitation and addition of acid, assumes a mahogany-brown tint.

Catechol is shown by the deep brown colouration it gives with potassium chromate or bichromate, whereas cade oil gives no such reaction.

Oil of cade is employed as a stimulant antiseptic in chronic skin diseases. Unguentum Olei Cadini is prepared by melting together equal weights of oil of cade and yellow beeswax. It is applied for psoriasis and eczema, and may be diluted with lard or soft paraffin if necessary. As a cleansing antiseptic application in psoriasis, dissolve 1 of oil of cade, and 4 of soft soap, in 4 of alcohol. It is better to begin with weak preparations, 2 per cent. or less, and to gradually increase the strength if necessary. Medicated soaps are prepared containing 5 or 10 per cent. of oil of cade.

### OLEUM CAJUPUTI.

#### OIL OF CAJUPUT.

Oil of cajuput is obtained by distillation from the leaves and twigs of *Melaleuca Leucadendron*, Linn. (N.O. Myrtaceæ), and various allied species indigenous to Upper India, the islands of the Malay Archipelago, Northern Australia, etc., the oil being distilled in the Molucca Islands, and imported by way of Batavia and Singapore.

It occurs as a green to bluish-green, oily liquid, having an agreeable camphoraceous odour and an aromatic, bitter, camphoraceous taste. Soluble in all proportions of alcohol; in 80 per cent. alcohol (1 in 1); often gives clear solutions with 70 per cent. alcohol (1 in 3 to 5). Specific gravity, 0.920 to 0.930 (0.915 to 0.925 at 25°). Rotation, 0° to -2°.

The principal constituent of the oil is cineol,  $C_{10}H_{18}O$ , which should be present to the extent of 55 to 65 per cent., as determined by the phosphoric acid process (see Oleum Eucalypti). Solid terpineol,  $C_{10}H_{18}O$ , is also present, as well as its acetic acid ester; l-pinene,  $C_{10}H_{16}$ ; several aldehydes, such as valeric, butyric, and benzoic. The green colour of the oil is due to contamination with copper; it can be removed by redistillation or by shaking the oil with a concentrated solution of tartaric acid. The presence of turpentine as an adulterant lowers the specific gravity of the oil, as also does the abstraction of cineol.

Oil of cajuput, when applied externally, acts as a stimulant and mild counter-irritant. It is applied to inflamed and rheumatic joints diluted with 2 parts of olive oil or turpentine liniment. Internally, it is antispasmodic, and is given on sugar or as Spiritus Cajuputi to relieve flatulent colic. It has also been given internally in chronic rheumatism, and has the typical action of a volatile oil.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

**OLEUM CAMPHORÆ ESSENTIALE.**

## ESSENTIAL OIL OF CAMPHOR.

Essential oil of camphor is obtained as a by-product in the manufacture of camphor from the camphor laurel, *Cinnamomum Camphora*, T. Nees and Eberm. (N.O. Laurineæ), a large tree found native in Formosa, Japan, and China.

It occurs as a yellow liquid, having the odour of camphor. Its properties and composition are very variable, largely on account of the more or less complete separation of the camphor, and fractionation. No definite standards can be given. Specific gravity, about 0.960. The oil is dextro-rotatory.

The oil contains acetaldehyde, camphor, terpineol, safrol, eugenol, cineol, d-pinene, phellandrene, dipentene, and cadinene. The heavy fractions of the oil are valuable as the source of safrol, which is used in large quantities in the preparation of synthetic heliotropin. The lighter fractions, which may consist of nothing but terpenes, are used as a solvent of resins, and as a substitute for turpentine.

Essential oil of camphor is employed as a rubefacient and mild counter-irritant to rheumatic and inflamed joints. It may be applied undiluted or mixed with an equal quantity of olive oil.

**OLEUM CARUI.**

## OIL OF CARAWAY.

*Synonym.*—Oleum Cari.

Oil of caraway is obtained by distillation from the freshly crushed fruit of caraway, *Carum Carvi*, Linn. (N.O. Umbelliferae), cultivated in England, Holland, Norway, and Eastern Prussia.

It occurs as a colourless liquid, becoming yellow on keeping, having the characteristic odour of caraway, and a mild, spicy taste. Sparingly soluble in 70 per cent. alcohol; yields a clear solution with 3 to 10 volumes of 80 per cent. alcohol, and with an equal volume of alcohol. Specific gravity, 0.907 to 0.920 (0.905 to 0.915 at 25°). Rotation, +70° to +85°. Exposure to the air causes the oil to become viscous and of a higher specific gravity, and so also with carvone, the chief constituent of the oil. If either, in such condition, be dissolved in an equal volume of alcohol, the addition of a few drops of very diluted solution of ferric chloride produces a reddish-violet colour, vanishing on the further addition of ferric chloride. No such reaction is given with the freshly distilled substance.

Carvone (carvol),  $C_{10}H_{14}O$ , an unsaturated ketone, is the chief constituent, and is present to the extent of 50 to 60 per cent. The only other important constituent of the oil is the terpene d-limonene, also called carvene, the specific gravity of which is 0.846, rotation about +107°, boiling-point, 175° to 176°. Carvacrol is said to be present in traces. Alcohol, which is sometimes used as an adulterant, should be specially looked for in testing the oil. Fractional distilla-



tion of the oil should yield not more than 25 per cent. below  $185^{\circ}$ , and at least 55 to 65 per cent. over  $200^{\circ}$ .

Oil of caraway is an aromatic carminative to the gastro-intestinal tract, and is used in purgative pills to allay the tendency to griping. It may be given on sugar to remove flatulent colic, and as Aqua Carui to children for the same purpose.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM CARYOPHYLLI.

### OIL OF CLOVES.

Oil of cloves is obtained by distillation from the unexpanded flower-heads of *Eugenia caryophyllata*, Thunb. (N.O. Myrtaceæ), cultivated in Sumatra, Penang, the Seychelles, Zanzibar, and Pemba, and largely imported from the last two places.

It occurs as an almost colourless or pale yellow liquid when recently distilled, gradually becoming reddish-brown; strongly refractive; odour strongly aromatic and taste persistently burning. Soluble in all proportions of alcohol; in 70 per cent. alcohol (1 in 2), in 60 per cent. alcohol (1 in 60); in ether, and in strong acetic acid. Specific gravity, 1.050 to 1.070 (1.040 to 1.060 at  $25^{\circ}$ ). Rotation, from  $0^{\circ}$  to  $-1^{\circ} 10'$ . An alcoholic solution of the oil yields a blue colour with test solution of ferric chloride. Shaken with its own volume of strong solution of ammonia it forms a semi-solid yellowish mass. The oil distils between  $250^{\circ}$  and  $260^{\circ}$ . Most adulterations lower the specific gravity. Turpentine may be discovered by fractional distillation. Eugenol, being used in the manufacture of vanillin, is liable to be abstracted from the oil. The constants given, however, will readily detect this and other forms of fraud.

Oil of cloves consists chiefly of eugenol,  $C_{10}H_{12}O_2$ , a phenol, which is present to the extent of 85 or 90 per cent., and the most valuable and characteristic constituent of the oil. It boils, under ordinary pressure, with slight decomposition, at  $253^{\circ}$  to  $254^{\circ}$ . It may be obtained in a pure state by treating the oil with weak soda solution (2 to 5 per cent.), and after shaking out the alkaline solution several times with ether to remove caryophyllene and other bodies, decomposing it with sulphuric acid. The amount present in the oil can be determined as follows:—Introduce into a flask with a long neck (graduated in decimils) 10 mls of the oil of cloves and 100 mls of solution of potassium hydroxide, and shake the mixture for five minutes. When the liquids have separated completely, add sufficient solution of potassium hydroxide to raise the lower limit of the oily layer to the zero mark of the scale, and note the volume of the residual liquid, which should not measure more than 1 to 1.5 mls, indicating the presence of 85 to 90 per cent. of eugenol. Thom's process for the determination of this phenol depends on converting the eugenol into its benzoyl derivative, separating and weighing as such. Caryophyllene,  $C_{15}H_{24}$ , a sesquiterpene, is also present.

Other constituents are furfural,  $C_5H_4O_2$ , which is probably the cause of the oil becoming darker in colour; methyl amyl-ketone,  $C_5H_{11}COCH_3$ , a body which communicates the much valued fruity odour to the oil; vanillin, methyl alcohol, salicylic acid, and about 2 per cent. of acetyl-eugenol.

Oil of cloves, like other volatile oils, is antiseptic and antiputrescent; it is often employed as a preservative of organic substances when its odour is unobjectionable. Externally, it is rubefacient, counter-irritant, and slightly anæsthetic; mixed with 2 parts of olive oil it may be applied to neuralgic areas; and as Linimentum Succini Compositum it is employed as an embrocation in bronchitis, whooping-cough, rheumatism, etc. Internally, oil of cloves is antispasmodic and carminative. It may be given on sugar or in capsules to allay flatulent colic, and is added to purgative pills to prevent griping. Pills containing a large proportion of oil may be massed by the addition of a little soap. Oil of cloves is applied on cotton wool in dental caries to allay pain.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM CASSIÆ.

### OIL OF CASSIA.

*Synonym.*—Oil of Chinese Cinnamon.

Oil of cassia is obtained by distillation from *Cinnamomum Cassia*, Blume (N.O. Laurineæ), cultivated in Southern China.

It occurs as a mobile, yellowish or brownish liquid, strongly refractive, and having an odour and taste resembling those of oil of cinnamon, but the odour is less fragrant and more pungent, and the taste—sweetish, spicy, and burning—is harsher than that of the cinnamon oil. It is optically inactive, or has only a slight rotatory power either to the right or left. Readily soluble in 80 per cent. alcohol (1 in 2); it generally yields a clear solution with 3 parts of 70 per cent. alcohol, and also soluble in its own weight of glacial acetic acid or of 90 per cent. alcohol. The alcoholic solution is slightly acid to litmus. Specific gravity, 1.055 to 1.065 (1.045 to 1.055 at 25°). Boiling-point from 240° to 260°, with partial decomposition. On exposure to the air the oil becomes darker in colour and thicker.

This oil is almost identical in composition with oil of cinnamon, but it is richer in cinnamic aldehyde, of which it may contain 75 to 90 per cent. It also contains cinnamic acid, cinnamyl acetate, a terpene, etc. The free cinnamic acid, which is present to the extent of about 1 per cent., has the property of dissolving lead, which it may take up from the lead canisters in which the oil is shipped, and hence should be tested for by shaking with solution of hydrogen sulphide, when it should not assume a dark colour. On cooling the oil to 0°, and then shaking it with an equal volume of nitric acid, a crystalline mass is formed (this serves as an identification test). Two decimils of the oil, dissolved in 10 mils of alcohol, should

produce a brown, but not a green or blue, colouration, on the addition of a drop of ferric chloride solution (absence of oil of cloves or carbolic acid). Cinnamic aldehyde, the principal constituent, when shaken with a saturated solution of sodium acid sulphite, forms a crystalline mass of an addition compound, and the reaction is made use of for its assay as follows:— 10 mls of the oil is shaken in a flask with a long, narrow, graduated neck (Hirschsohn or cassia flask), with 10 mls of a 30 per cent. solution of sodium acid sulphite, and heated on a water-bath until the contents are liquefied; successive portions of the acid sulphite solution are then added, shaking well after each addition, until the flask is three-fourths full. The heating is continued until the odour of cinnamic aldehyde disappears, the solution cooled, and sufficient acid sulphite solution added to bring the lower layer of the supernatant oily liquid to zero mark on the graduated neck of the flask. This layer should measure not more than 2.5 mls, indicating at least 75 per cent. of cinnamic aldehyde. The specific gravity of cinnamic aldehyde and the other constituents of the oil being almost the same, differences in the aldehydic content are not apparent in the specific gravity.

Oil of cassia has properties resembling those of oil of cinnamon. It is employed as a flavouring agent and in place of true cinnamon oil.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

*NOTE.*—Oleum Cassiæ is official in the Pharmacopœia of the United States and the German Pharmacopœia as Oleum Cinnamomi.

## OLEUM CEDRI.

### CEDAR WOOD OIL.

Cedar wood oil is obtained by distillation from the wood of the red cedar, *Juniperus virginiana*, Linn. (N.O. Coniferæ), and other species, the first-named being a North American plant, in which the oil exists to the extent of 2.5 to 4.5 per cent.

It occurs as an almost colourless or slightly yellow, somewhat viscid liquid, occasionally containing crystals of cedar camphor, and having a mild but persistent, characteristic odour. Soluble in alcohol, with difficulty (1 in 10 to 20). Specific gravity, 0.945 to 0.950. Rotation,  $-30^{\circ}$  to  $-40^{\circ}$ . Refractive index, 1.505 at  $17^{\circ}$ .

The oil consists almost entirely of cedrene, a liquid sesquiterpene ( $C_{15}H_{24}$ ) obtained by fractional distillation, boiling at  $261^{\circ}$  to  $262^{\circ}$ ; specific gravity, 0.9359, rotation,  $-60^{\circ}$ . It may also contain a solid substance, cedar camphor or cedrol ( $C_{15}H_{26}O$ ), having the characteristics of a tertiary alcohol, melting at  $74^{\circ}$ , boiling at  $282^{\circ}$ . Cedrol, however, is not invariably present in the oil.

Cedar wood oil has been recommended for use in place of oil of sandal wood in gonorrhœa, but is rarely so employed. It is used for



its odour in perfumery, and is also used in microscopy with oil-immersion lenses, being thickened for this purpose, probably with Canada turpentine, so that its index of refraction is 1.52.

NOTES.—An inferior oil is obtained in America as a by-product in drying lead pencils; it contains only the more volatile portions of the natural oil, and has a lower specific gravity than the latter.

## OLEUM CETACEI.

### SPERM OIL.

Sperm oil is obtained from the blubber of the sperm whale or cachelot, *Physeter macrocephalus*, Linn. (Order, Cetacea). The fresh blubber separates on standing in the cold into a liquid and a solid portion, the former being the sperm oil, which may be obtained by filtration or expression.

It occurs as a thin yellow liquid, almost free from odour when of good quality, but often having a slightly unpleasant fishy odour. Soluble in alcohol (about 1 in 5 or 6); in all proportions of ether. Specific gravity, 0.875 to 0.844. Saponification number, 123 to 147. Iodine number, 79.5 to 84. On cooling the oil, spermaceti separates in crystalline scales, and stearin at a lower temperature.

The oil consists wholly of the esters of fatty acids and monovalent alcohols, and contains no glycerides, or only traces. When saponified with potassium hydroxide it forms potassium oleate and dodecatyl alcohol and some allied bodies. On shaking the aqueous solution of the resulting soap with ether, the higher alcohols are dissolved and may be obtained by evaporating the solvent. The fatty acids are isolated by acidifying the soap solution. These latter have all the characters of an acid of the oleic series mixed with one of the stearic series. Sperm oil may be adulterated with mineral oils, shark liver oil, African fish oil, indeed these are considered the only possible adulterants. The genuine oil gives a brown colouration with sulphuric acid, becoming somewhat darker with a tinge of violet on stirring. Shark oil gives by the same treatment a well-marked violet colour, the tint changing to red or reddish-brown on stirring.

Sperm oil has only a slight tendency to become rancid, and for this and other reasons is much valued as a lubricant for light machinery. It is also used for hardening steel.

## OLEUM CHENOPODII.

### CHENOPODIUM OIL.

*Synonym.*—American Wormseed Oil.

Chenopodium oil is obtained by distillation from the fruits of *Chenopodium ambrosioides*, var. *anthelminticum*, Gray (N.O. Chenopodiaceæ), a native of the West Indies and Central America.

It occurs as a colourless or yellow, thin liquid, having a disagree-

able, penetrating, camphor-like odour, and a bitter, burning taste. Soluble in 70 per cent. alcohol (1 in 10). Specific gravity, about 0.970 (0.965 to 0.985 at 25°); rotation, between  $-5^{\circ}$  and  $-6^{\circ}$ .

The oil is said to consist of limonene and a liquid oxygenated substance. Adulteration with American turpentine oil causes lowering of the specific gravity, slight dextro-rotation, and insolubility in 70 per cent. alcohol. To prove adulteration with turpentine oil, however, pinene must be shown to be present, as this latter body is not a constituent of the genuine oil. The oil distilled from the herb has an odour somewhat resembling that of trimethylamine. Little is known of its properties.

Chenopodium oil is employed as an anthelmintic, especially to expel round worms. The dose is given at bedtime, fasting, and followed by an aperient.

*Dose.*— $\frac{1}{4}$  to 2 decimils (1 to 3 minims).

### OLEUM CINEREUM.

#### GREY OIL.

Mercury ...	...	...	...	...	...	40.00
Wool Fat ...	...	...	...	...	...	10.00
Liquid Paraffin, sufficient to produce (by weight) ...	...	...	...	...	...	100.00

Melt the wool fat, pour into a warm mortar, and, when it is nearly cold but still liquid, add the mercury and triturate until a homogeneous mixture is obtained; then add the liquid paraffin.

Grey oil is used by intra-muscular injection, preferably in the gluteal region. It is employed in syphilis, the injection being given about once weekly. It should be used with caution.

*Dose.*—6 to 12 centimils (1 to 2 minims).

### OLEUM CINNAMOMI.

#### OIL OF CINNAMON.

Oil of cinnamon is obtained by distillation from cinnamon bark, *Cinnamomum zeylanicum*, Breyn (N.O. Laurineæ), a native of Ceylon.

It occurs as a light yellow liquid when freshly distilled, gradually becoming reddish, and having the fragrant, characteristic odour and the warm, sweet, aromatic taste of the bark. It has a much more delicate odour and flavour than the oil of cassia, to which it is similar in composition. It is slightly lævogyrate  $-0.5^{\circ}$  to  $-1^{\circ}$ . Soluble in alcohol (10 in 3), in 70 per cent. alcohol (1 in 2), in 60 per cent. alcohol (1 in 45). Specific gravity, 1.025 to 1.035, but genuine oil has been obtained with as high a figure as 1.038.

The chief constituent of the oil is about 50 per cent. of cinnamic aldehyde, a compound which may be converted into cinnamic and benzoic acids by oxidation; the oil also contains about 4 to 8 per cent. of eugenol, together with phellandrene, and other terpenes. On dissolving 1 mil in 5 mils of alcohol and adding solution of

ferric chloride, the colour produced should be pale green, not deep blue (absence of leaf oil). The cinnamic aldehyde may be determined by the method described under *Oleum Cassiæ*. Adulteration with leaf oil diminishes the cinnamic aldehyde content and increases that of the eugenol. Adulteration with cassia oil increases the specific gravity and also the cinnamic aldehyde content. The value of cinnamon oil, however, is not altogether dependent on the amount of cinnamic aldehyde it contains, as in the case of cassia oil, but rather in the non-aldehydic bodies to which the fine flavour is probably due.

Oil of cinnamon, like the other essential oils, is carminative to the gastro-intestinal tract and possesses antiseptic properties. It is taken internally on sugar or as *Spiritus Cinnamomi*, for common and influenzal colds. It is inhaled for phthisis (30 minims in 1 pint of hot water), and, as a spray, is used (1 in 20 of liquid paraffin) in catarrh. Lozenges and pastilles are prepared, containing the oil.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

NOTE.—*Oleum Cinnamomi*, U.S.P., is oil of cassia from *C. Cinnamon*, Blume

## OLEUM COCOS.

### COCONUT OIL.

*Synonyms*.—*Oleum Cocois Nuciferæ*; Coprah Oil.

Coconut oil is a fat obtained by expression from the kernels of the coconut, the fruit of *Cocos nucifera*, Linn., and *C. butyracea*, Linn. (N.O. *Palmeæ*), growing chiefly in Cochin and Ceylon.

It occurs as a solid, white or pearl-white fat of the consistence of lard, having a bland taste, and a peculiar but not unpleasant odour. Soluble in alcohol (1 in 2) at 60°, less soluble at ordinary temperatures, very soluble in ether, chloroform, and in carbon bisulphide. Specific gravity, 0.903 at 100°; melting-point, 23.5° to 25°. Solidifies at 13° to 12°. On exposure to the air the oil readily turns rancid, acquiring an unpleasant odour and a strong acrid taste. It is readily saponified by the strong alkalies, and, from the fact that its soap is not easily precipitated by salt solution, is largely used in making "marine" soap.

The oil contains trimyristin and trilaurin, and in smaller proportions tripalmitin, tristearin, and triolein, besides the glycerides of the volatile caproic, caprylic, and capric acids. The free fatty acids vary from 5 to 17 per cent., or even more, according to the source of the oil. Its high saponification number (258), and low iodine value (8 to 9.5) are characteristic. The solid fats may be separated from the liquid by cold pressure. The oil is largely used as an adulterant of oil of theobroma.

Coconut oil is used as a lubricant in massage, as a dressing for the hair, and more especially in soap manufacture. It has been recommended as an ointment basis on account of its ready



absorption. It has been given internally as a substitute for cod-liver oil.

*Dose*.—8 to 16 grammes (2 to 4 drachms).

NOTES.—A deodorised variety of coconut oil is prepared. Coconut stearin, melting at  $28.8^{\circ}$ , is used as a suppository basis.

## OLEUM COPAIBÆ.

### OIL OF COPAIBA.

Oil of copaiba is obtained by distillation from copaiba, the oleoresin from *Copaifera Lansdorfii*, Desf. (N.O. Leguminosæ), and other species of copaiba indigenous to Brazil, Venezuela, New Granada, and other parts of Central and South America.

It occurs as a colourless or pale yellow liquid having the characteristic pepper-like odour of the balsam, a bitter, pungent, persistent taste, and a neutral reaction. Soluble in alcohol (1 in 20); in all proportions of absolute alcohol (distinction from African copaiba oil), but nearly insoluble in 60 per cent. alcohol. Specific gravity, 0.900 to 0.910 (0.895 to 0.905 at  $25^{\circ}$ ), varying considerably with age and exposure to air. Boiling-point between  $250^{\circ}$  and  $275^{\circ}$ ; rotation  $-7^{\circ}$  to  $-35^{\circ}$ .

The chief and only well-defined constituent of oil of copaiba is the sesquiterpene, caryophyllene,  $C_{15}H_{24}$ , identical with that from oil of cloves. This, on treatment with glacial acetic acid and sulphuric acid, yields a hydroxide,  $C_{15}H_{25}OH$ , in crystals melting at  $96^{\circ}$ . A crystalline acid (melting-point,  $140^{\circ}$ ) which has been identified as a symmetric dimethyl succinic acid,  $C_6H_{10}O_4$ , has also been obtained (about  $1\frac{1}{2}$  per cent.), but whether it originates in caryophyllene or some other minor constituent is not known. A small amount of terephthalic acid has been obtained on oxidising the oil. The chief adulterant of oil of copaiba is gurjun or wood oil, but this may readily be recognised by its high specific gravity, its difficult solubility, high boiling-point, and strong rotatory power. The following colour test has been recommended for its detection. Into a test-tube place 1 mil of glacial acetic acid, add 2 decimils of pure concentrated nitric acid, and mix; then add 2 decimils of oil to this mixture, allowing the oil to float on top. If gurjun or wood oil be present, a reddish or purple zone will be developed between the layer of oil and the acid mixture in a few minutes. No reaction occurs if the oil is pure. Oil of African copaiba, another adulterant, is not soluble in an equal volume of absolute alcohol, and is dextro-rotatory. Copaiba oil is frequently used in adulterating other volatile oils. Para copaiba yields 60 to 90 per cent. oil; Maracaibo copaiba about 40 per cent.

Oil of copaiba resembles the oleoresin in its action. It may be given as an emulsion prepared as described under *Acaciæ Gummi*, or enclosed in a gelatin capsule.

*Dose*.—3 to 12 decimils (5 to 20 minims).

**OLEUM CORIANDRI.**

## OIL OF CORIANDER.

Oil of coriander is obtained by distillation from the crushed ripe fruit of *Coriandrum sativum*, Linn. (N.O. Umbelliferæ), a native of the Levant and Southern Europe, cultivated in many countries and in nearly all climates, the best yield being obtained from Moravian, Thuringian, and Russian coriander.

It occurs as a colourless or slightly yellow liquid, having the characteristic aromatic odour of the fruit, and a warm, spicy taste. Soluble in alcohol (2 in 1), in 70 per cent. alcohol (1 in 3), forming a clear solution (1 in 75), in 60 per cent. alcohol (absence of turpentine and other terpenes). Specific gravity, 0.870 to 0.885 (0.863 to 0.878 at 25°); rotation, +8° to +14°.

The chief constituent of the oil is coriandrol, an alcohol,  $C_{10}H_{17}OH$ , identical in all respects with linalool, except in the matter of rotation; being dextro-rotatory, it is regarded as the dextro modification of linalool. It is present to the extent of 90 per cent., has a specific gravity of 0.868, and boils at 194° to 198°. On oxidation it yields citral, and it may be converted by appropriate treatment into geraniol. The only other definitely known constituent is the terpene d-pinene,  $C_{10}H_{16}$  (about 5 per cent.), boiling at 156° to 160°. Specific gravity, 0.861; rotation, +32° 42'. The characteristic odour of the oil is due to some body not yet identified. The common adulterant is oil of orange, which may be detected by the lowering of the specific gravity, increase in rotatory power, and imperfect solubility. Other adulterants are the oils of cubebs, cedar, and turpentine.

Oil of coriander is aromatic, stimulant, and carminative to the gastro-intestinal tract. It is added to purgative medicines to diminish the tendency to griping.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

**OLEUM CROTONIS.**

## CROTON OIL.

*Synonym.*—Oleum Tiglii.

Croton oil is obtained by expression from the seeds of *Croton Tiglium*, Linn. (N.O. Euphorbiaceæ), indigenous to the Malabar Coast, and cultivated in Southern Asia and China. The oil is expressed in India or England.

It occurs as an amber-yellow, orange, or brown-coloured liquid, viscid, having a nauseous odour, and a taste at first mild but afterwards sharp and acrid. It is a weak drying oil, and thickens somewhat on exposure to the air. Soluble in less than one volume of absolute alcohol, forming a clear solution; with an equal volume the solution is turbid, and more of the alcohol causes complete separation

into two layers, the active constituent being contained in the alcoholic solution; soluble in all proportions of petroleum ether (difference from castor oil); freely soluble in ether, chloroform, carbon bisulphide, oil of turpentine, and fixed and volatile oils, but only partially soluble in alcohol. The solubility in alcohol appears to depend upon the proportion of free acids present, and increases with the age of the oil. Completely soluble in glacial acetic acid at ordinary temperatures. Absolute alcohol causes separation into two parts, the insoluble being non-vesicating, the soluble, vesicating. The alcoholic solution should not redden blue litmus. Oils extracted from the seeds by alcohol are soluble in all proportions of alcohol. Specific gravity, 0.940 to 0.960 (0.935 to 0.950 at 25°). Slightly dextro-rotatory. Solidifying-point,  $-16^{\circ}$ ; iodine value, 102 to 109; saponification value, 210 to 215.

The composition of the oil is very complex, and the nature of the active principle not yet fully ascertained. It may contain stearic, palmitic, myristic, lauric, valeric, butyric, acetic, formic, oleic, and tiglic acids, and their glycerides. The active constituent is called "croton-oleic acid," and consists of several inactive, oily acids, together with a powerfully vesicant substance named croton-resin,  $C_{13}H_{18}O_4$ , which is believed to be a lactone or inner anhydride of complicated structure. It is a hard, pale yellow, brittle substance, nearly insoluble in water, petroleum ether, or benzene, but readily soluble in alcohol, ether, or chloroform. It has neither basic nor acid properties, but produces on oxidation with nitric acid a mixture of acids. The vesicating power of the resin is destroyed by boiling with alkalis. Adulteration with castor oil increases the specific gravity, lowers the iodine value, raises the acetyl value considerably, and affects the solubility. Hydrocarbons, sometimes used as adulterants, may be detected by distillation in a current of steam, and their amount calculated from the saponification value. Absence of other non-drying oils may be shown by adding one volume of a mixture of equal parts of fuming nitric acid and water to one volume of the oil, and shaking vigorously. It should not solidify, either completely or partially, but may thicken slightly, after standing for two days.

Croton oil is an extremely powerful cathartic; in any save the smallest doses it is a violent irritant of the stomach and intestines, causing violent vomiting and purging, followed by collapse. It must therefore be used with great care, and is contra-indicated in feeble subjects, where there is organic obstruction, or in inflammatory conditions of the stomach and intestine. Croton oil is given on a piece of sugar, or made into a pill with crumb of bread or soap and liquorice powder. Externally, it is a powerful counter-irritant and vesicant. Croton collodion is a mixture of 1 part of croton oil with 9 parts of flexile collodion. As Linimentum Crotonis, the oil is applied in gout, rheumatism, neuralgia, and pulmonary diseases. Its use may be followed by the appearance of a pustular eruption.

*Dose.*—3 to 6 centimils ( $\frac{1}{2}$  to 1 minim).



**OLEUM CUBEBAE.**

OIL OF CUBEBS.

*Synonym.*—Oil of Cubeb.

Oil of cubebs is obtained by distillation with steam from coarsely ground cubebs, the fruit of *Piper Cubeba*, Linn. (N.O. Piperaceæ), a plant indigenous to Java, Sumatra, and Borneo, and apparently also cultivated in those islands.

It occurs as a light green or bluish-green liquid, having the characteristic odour, and warm, camphoraceous taste of cubebs. The oil may be colourless, in which case the last portions of the distillate, which are blue, have been withheld. The colour of the oil is not due to the presence of copper, as frequently supposed, but to this blue fraction, the nature of which is, so far, unknown. Soluble in alcohol (1 in 18); in all proportions of absolute alcohol. Specific gravity, 0·910 to 0·938 (0·905 to 0·925 at 25°); rotation,  $-30^{\circ}$  to  $-40^{\circ}$ .

The constituents of the oil are mainly, if not wholly, terpenes and sesquiterpenes. Dipentene,  $C_{10}H_{16}$ , is present; a lævo-rotatory terpene (rotation  $-35\cdot5^{\circ}$ ), presumably pinene or camphene; two sesquiterpenes, one identical with cadinene,  $C_{15}H_{24}$ . Cubeb camphor, in oil distilled from old cubebs, appears to be a crystalline sesquiterpene alcohol, derived from the sesquiterpenes by oxidation, having the formula  $C_{15}H_{25}OH$ . It is lævo-rotatory, crystallising in rhombic forms, and melting at  $65^{\circ}$ . It is somewhat unstable, decomposing when kept over sulphuric acid into sesquiterpene and water. Oil distilled from old cubebs (which contains the cubeb camphor) can be recognised by immersing a piece of potassium or sodium in it, when the metal loses its lustre and becomes covered with a crust, whilst with an oil from the fresh cubebs the metal is not attacked. This oil is seldom adulterated. Not more than 10 per cent. should distil below  $250^{\circ}$ , and at least 75 per cent. should distil between  $250^{\circ}$  and  $280^{\circ}$ .

Oil of cubebs is employed as a stimulating antiseptic to the bronchial and genito-urinary mucous membranes, in chronic bronchitis, gonorrhœa, cystitis, etc. It is excreted by the bronchioles, kidneys, and skin. The oil may be emulsified, as described under *Acaciæ Gummi*, or it may be administered in capsules. It is inhaled from hot water in chronic bronchitis.

*Dose.*—3 to 12 decimils (5 to 20 minims).

**OLEUM ERIGERONTIS.**

OIL OF ERIGERON.

*Synonym.*—Oil of Canadian Fleabane.

Oil of erigeron is obtained by distillation from the herb *Erigeron canadensis*, Linn. (N.O. Compositæ), which is frequently found growing in the peppermint fields of America.

It occurs as a pale yellow, mobile liquid, which on exposure to air rapidly resinifies, and becomes darker in colour and viscid. It

has a peculiar, aromatic, persistent odour suggesting caraway, and an aromatic, slightly pungent taste. Soluble in an equal volume of alcohol, forming a clear solution, and having a neutral reaction. Specific gravity, 0·850 to 0·870 (0·845 to 0·865 at 25°); rotation, +52°; boiling-point, 175°.

The oil consists chiefly of dextro-limonene, but also contains small quantities of aldehydes, and sometimes terpineol, which however is regarded as a decomposition product.

Oil of erigeron resembles in its action oil of turpentine, but it is less irritating. It has been employed to arrest hæmorrhage from the lungs, uterus, or alimentary tract, but the drug has no such action. The oil may be given in capsules, or an emulsion prepared by the method described under *Acaciæ Gummi*.

*Dose*.— $\frac{1}{4}$  to 2 mls (5 to 30 minims).

## OLEUM EUCALYPTI.

### OIL OF EUCALYPTUS.

Oil of eucalyptus is obtained by distillation from the fresh leaves of *Eucalyptus Globulus*, Labill. (N.O. Myrtaceæ), and other species of *Eucalyptus*, which yield oils containing a large proportion of cineol, and but little phellandrene. The trees are natives of Australia and Tasmania, and are cultivated in Algeria and other of the Mediterranean countries.

It occurs as a light yellow, mobile liquid of a pleasant, refreshing camphoraceous odour and a spicy taste, producing an after sensation of cold in the mouth. Soluble in alcohol (3 in 1 or less), in all proportions of absolute alcohol, in 60 per cent. alcohol (1 in 38), in oils, fats, paraffins, and very slightly soluble in water. The oil from *E. amygdalina*, Labill., is less soluble in 60 per cent. alcohol (1 in 175). Specific gravity, 0·905 to 0·930 (0·905 to 0·925 at 25°); rotation, —10° to +10°.

The chief constituent of the oil is cineol (eucalyptol or cajuputol),  $C_{10}H_{18}O$ . Oils containing much cineol solidify to a white crystalline mass when cooled in a freezing mixture of ice and salt. The assay process may be performed as follows:—To a known weight of the oil add, drop by drop, one to one and a half times its volume of phosphoric acid (specific gravity, 1·750), keeping the mixture well cooled and continuously stirred (excess must be avoided; the reaction is complete as soon as a drop of the acid produces a red colouration). The crystalline magma formed,  $C_{10}H_{18}O \cdot H_3PO_4$ , is pressed between filtering paper, and when the adherent terpenes and phosphoric acid have been removed as far as possible, either in this way or by washing with petroleum spirit, the crystals are decomposed by hot water in a graduated tube. On cooling, the cineol is measured, and from its specific gravity (0·930) the weight may be calculated. The separated cineol should readily crystallise on cooling to —3°, otherwise it is impure, and the process must be repeated. The

oil should yield over 50 per cent. of cineol. Other constituents of eucalyptus oil are d-pinene (eucalyptene) and other terpenes, as well as various aldehydes, ethylic and amylic alcohols, and esters. Phellandrene, which is present in small quantities, forms a crystalline nitroside with nitrous acid, and as it occurs abundantly in some oils of eucalyptus, especially that of *E. amygdalina*, and is an objectionable substance it should be tested for by adding to 1 mil of the oil 2 mils of glacial acetic acid and 2 mils of a saturated aqueous solution of sodium nitrite. On shaking or stirring the mixture no crystalline mass should be formed.

Oil of eucalyptus resembles the other essential oils in its action, though at one time credited to have a specific action in malaria and fevers. It is employed as an antiseptic and deodoriser, being largely used for inhalation. The oil is sprinkled on the handkerchief and inhaled frequently for catarrhal colds and to prevent infection. Mixed with menthol, camphor, or pine oil it can be inhaled from a "dry" inhaler. As Vapor Eucalypti, it is inhaled with steam to relieve cough in chronic bronchitis and asthma. Pastilles are much used in catarrhal colds with sore throat, often with menthol or red gum. Oily spray solutions for use in catarrh are prepared with eucalyptus and pine oils, and other ingredients (see Nebulæ) such as cocaine, menthol, camphor, etc. It is used in bougies, suppositories, and pessaries, as an antiseptic, and to disguise the smell of iodoform. Antiseptic gauze, wool, and lint are prepared impregnated with oil of eucalyptus, for use as surgical dressings. Internally, eucalyptus oil is given in catarrhal inflammation of the mucous membranes, especially of the respiratory tract and bladder. It may be given in capsules or an emulsion prepared by shaking in a dry bottle 1 part of oil with 1 part of powdered acacia and adding 50 parts of water. Such an emulsion may also be used as an injection into the urethra or bladder.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims), or more.

NOTES.—"Lemon-scented" eucalyptus oil is obtained from *Eucalyptus maculata* var. *citriodora*, Hook.; it contains 84 to 90 per cent. of citronellal, and is used for inhalation in a similar way to oil of *Eucalyptus Globulus*.

## OLEUM FÆNICULI.

### OIL OF FENNEL.

Oil of fennel is obtained by distillation from the dried ripe fruit of *Fœniculum vulgare*, Mill, also known as *F. capillaceum*, Gilib. (N.O. Umbelliferæ), a plant cultivated in Germany, Russia, Japan, etc.

It occurs as a colourless or slightly yellow liquid, having the characteristic aromatic odour of fennel, and a taste bitter at first and camphoraceous, but afterwards sweetish. Soluble in an equal volume of alcohol; in 80 per cent. alcohol (1 in 5 to 8). The alcoholic solution is neutral to litmus, and is not coloured by the addition of ferric chloride solution (absence of oils containing phenols). Specific gravity, 0.960 to 0.980 (0.953 to 0.973 at 25°);

25° 1.000



optical rotation,  $+6^{\circ}$  to  $+20^{\circ}$ ; solidifying point between  $5^{\circ}$  and  $10^{\circ}$ , but should not fall below  $5^{\circ}$ .

The chief and most valuable constituent of the oil is anethol (50 to 60 per cent.), which crystallises out in the cold. It also contains 18 to 20 per cent. of fenchone ( $C_{10}H_{16}O$ ), a ketone isomeric with camphor, strongly dextrogyrate, and convertible into fenchyl alcohol by sodium. Anethol is usually in greatest proportion in those oils containing the least fenchone. The following bodies may also be present in the oil:—Fenchol, dextro-pinene, dipentene, phellandrene, and limonene. The characteristic fennel odour is produced by the anethol and fenchone. Oils deprived of some of their anethol by freezing or fractionation have their congealing point lowered, while the addition of alcohol or turpentine may be suspected from the lowering of the specific gravity.

Oil of fennel is an aromatic carminative to the gastro-intestinal tract, and is employed with purgative medicines to prevent griping, and also in the intestinal colic of children, as *Aqua Fœniculi*.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM GAULTHERIÆ.

### OIL OF GAULTHERIA.

*Synonym*.—Oil of Wintergreen.

Oil of wintergreen is obtained by distillation from the leaves of *Gaultheria procumbens*, Linn. (N.O. Ericaceæ).

It occurs as a colourless or yellowish liquid, having a characteristic and strongly aromatic odour, which is distinctly different from that of the nearly identical oil obtained from *Betula lenta*, Linn., and a sweetish, aromatic taste. Readily soluble in alcohol, ether, chloroform, and glacial acetic acid. It should yield a perfectly clear solution with 6 parts of 70 per cent. alcohol at  $20^{\circ}$ . Specific gravity, 1.175 to 1.185 (1.172 to 1.180 at  $25^{\circ}$ ); boiling-point,  $218^{\circ}$  to  $221^{\circ}$ . It rotates the plane of polarised light slightly to the left, viz.,  $-0^{\circ} 25'$  to  $-1^{\circ}$  (oil of betula is optically inactive). Admixture with the otherwise almost identical betula oil, or with artificial methyl salicylate, can therefore be detected by depression of the rotatory power below  $-0^{\circ} 25'$ , and by the odour.

The oil consists almost entirely of methyl salicylate, with about 1 per cent. of other bodies, including an alcohol or ketone, and an ester, to the presence of which is due the very characteristic odour by which wintergreen oil is distinguished from artificial methyl salicylate.

Oil of wintergreen has the properties of the salicylates. It is given internally in acute rheumatism, usually in capsules on account of its pungent taste. Applied to the skin, it is readily absorbed; it may, however, give rise to an eruption, and pure methyl salicylate is therefore preferred for external application. It is an invaluable

application for all chronic rheumatic affections, chronic joint troubles, muscle affections and lumbago (see *Methylis Salicylas*). Oil of wintergreen is much used to flavour tooth powders, pastes, and liquid dentifrices, often with menthol and oil of eucalyptus.

*Dose*.—3 to 9 decimils (5 to 15 minims).

NOTES.—The methoxymethyl ester of salicylic acid has been introduced under the trade-name Mesotan, as a substitute for oil of gaultheria for external use; it is mixed with an equal quantity of olive oil for use, but sometimes gives rise to an eruption of the skin.

## OLEUM GERANII.

### OIL OF GERANIUM.

*Synonyms*.—Oil of Rose Geranium; Oil of Pelargonium.

Oil of geranium is obtained by distillation from *Pelargonium odoratissimum*, Willd., *P. capitatum*, Ait., and *P. roseum*, Willd. (N.O. Geraniaceæ), the plants being cultivated for the purpose in France, Algiers, Spain, Réunion, and Corsica. The oil is found in all green parts of the plants, but the greatest yield is obtained from the leaves.

It occurs as a colourless, greenish, or brownish liquid, with a pleasant rose-like odour. Specific gravity, 0.890 to 0.906. Soluble in 70 per cent. alcohol (1 in 2 or 3), except in the case of Spanish oil, which may form a turbid mixture with the alcohol, owing probably to the presence of some fatty oil as an adulterant. Saponification number, 45 to 100. Ester percentage, calculated as geranyl tiglate, 19 to 42.

The chief constituent of the oil is geraniol, but citronellol is also present, and mixtures of the two alcohols have been described as "rhodinol" and "reuniol"; linalool is present in the lower fractions of the oil. Spanish oil, which is the most esteemed variety, contains 65 per cent. of geraniol and 35 per cent. of citronellol; African oil contains 80 per cent. of geraniol and 20 per cent. of citronellol; Réunion oil contains 40 per cent. each of geraniol and citronellol. Oil of turpentine, cedar wood oil, and fatty oils are used as adulterants of oil of geranium, but they are all insoluble in 70 per cent. alcohol.

Oil of geranium is largely employed in perfumery, and it is frequently used instead of oil of rose for perfuming tooth powders, ointments, and other preparations.

## OLEUM GOSSYPII SEMINIS.

### COTTON SEED OIL.

Cotton seed oil is obtained by expression from the seeds of *Gossypium herbaceum*, Linn. (N.O. Malvaceæ), and other species of *Gossypium*, the plants being extensively cultivated in the United States, Egypt, and India. It is refined by a method of partial saponification, whereby the dark-red colouring matter of the crude oil is carried down

as a precipitate along with the soap formed, the supernatant oil being of a very pale colour.

It occurs as a pale yellow liquid, odourless, and having a bland, nutty taste. Sparingly soluble in alcohol, readily soluble in ether, chloroform, and carbon bisulphide. Specific gravity about 0.925 (0.915 to 0.921 at 25°). On cooling to about 12°, particles of solid fat separate, and at a temperature between 0° and -5° the oil becomes solid, or nearly so. Sulphuric acid (specific gravity, 1.6 to 1.7) added to the oil diluted with carbon bisulphide produces a reddish-brown colour. A few mils of the oil shaken vigorously with an equal volume of nitric acid (specific gravity, 1.375), and allowed to stand for some time, up to twenty-four hours, gives a characteristic coffee-brown colouration. On shaking 5 mils of the oil in a test-tube with 5 mils of an alcoholic solution of silver nitrate (made by dissolving 1 decigram of silver nitrate in 10 mils of alcohol, and adding 1 decimil of nitric acid), and heating on a water-bath for about five minutes, a reddish or brownish colour is produced. If a test-tube containing a mixture of 2 mils of the oil with 2 mils of amyl alcohol, and 2 mils of a carbon bisulphide solution of sulphur (1 per cent.) be heated on a water-bath, and the temperature maintained for some time, the carbon bisulphide evaporates, and the oil acquires a deep-red colouration in the course of five to fifteen minutes. By this test, known as the Halphen colour reaction, it is possible to detect 5 per cent. or less of cotton seed oil in admixture with other oils, provided it has not been previously heated to 200° or over. The nitric acid test mentioned above is a useful confirmatory test, but the silver test is not considered as of any great value. Iodine value of the oil, 102 to 108; iodine value of the liquid fatty acids, 149; solidifying point of the mixed fatty acids, about 32°; melting-point, about 36°.

The oil consists of the glycerides of palmitic, stearic, oleic, and linolic acids. It is a typical semi-drying oil.

Cotton seed oil is employed similarly to olive oil in preparations for external use.

*Dose*.—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce), or more.

## OLEUM GRAMINIS CITRATI.

### OIL OF LEMON GRASS.

*Synonyms*.—Indian Oil of Verbena; Indian Melissa Oil.

Oil of lemon grass is obtained by distillation from the entire herb, *Andropogon Schænanthus*, Linn. (N.O. Gramineæ), which is widely cultivated in India.

It occurs as a reddish-yellow or brownish-red, mobile liquid, having a very strong odour, resembling that of verbena. Specific gravity, 0.895 to 0.905. Optical rotation, not more than +3° or -3°. Soluble in 70 per cent. alcohol (forming a clear solution with two or more parts).

The chief constituent of the oil is citral,  $C_{10}H_{16}O$ , an optically inactive aldehyde, which boils at 228° to 229°, and may be present to



the extent of 75 to 85 per cent., but should not be below 65 per cent. It may be determined by shaking 10 mls with 50 mls of a boiling 30 per cent. solution of sodium hydrogen sulphite, measuring the oily layer of non-aldehydic bodies, which separates on cooling, and deducting from the volume of oil originally taken. The oil also contains traces of an isomer of citral; geraniol,  $C_{10}H_{18}O$ ; methylheptenone,  $C_8H_{14}O$ ; traces of citronellal,  $C_{10}H_{18}O$ , possibly linalool, and the terpenes limonene and dipentene, which occur to the extent of about 10 per cent., together with a trace of cymene. Adulteration with fatty oils or petroleum may be recognised by the incomplete solubility in 70 per cent. alcohol. Acetone has been noted as an adulterant, and is readily detected by fractional distillation.

Oil of lemon grass was formerly used internally as a carminative; it is used mainly in perfumery and as a source of citral.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

*NOTES*.—Oil of lemon grass is official in India and the Eastern and West Indian Colonies. Oil of citronella is an allied grass oil obtained from *Andropogon nardus*; it consists largely of citronellal.

## OLEUM GYNOCARDIÆ.

### GYNOCARDIA OIL.

*Synonym*.—Chaulmoogra Oil.

Gynocardia oil is obtained by expression from the seeds of *Taraktogenos Kurzii*, King (N.O. Bixineæ), a native of Burmah.

It occurs as a solid fat of varying consistence, or as a brownish-yellow oil in warm weather, having a characteristic odour, a somewhat acrid taste, and an acid reaction. Cold alcohol dissolves the greater part of the oil, repeated treatment with warm alcohol dissolving the remainder. Soluble in ether, chloroform, and carbon disulphide. Specific gravity, 0.951 at 25°; 0.940 at 45°; optical rotation, +52°; melting-point, 22° to 23°; acid value, 23.9; saponification value, 213; iodine value, 103.2. A mixture of 1 mil with  $\frac{1}{2}$  a decimil of sulphuric acid acquires a reddish-brown colouration, changing to olive-green.

The oil contains chaulmoogric acid ( $C_{18}H_{32}O_2$ ), and also palmitic acid. On hydrolysis the fatty oil has been found to yield glycerol, a very small quantity of phytosterol ( $C_{26}H_{48}OH$ ), and a mixture of fatty acids (melting-point, 44° to 45°). Gynocardic acid, so-called, is a mixture of several substances.

Gynocardia oil is employed externally in the treatment of rheumatism, psoriasis, eczema, and other chronic skin diseases; and externally and internally in leprosy. On account of its disagreeable taste it is usually administered in capsules. It may be applied to the skin unmixed, or as Unguentum Gynocardiæ.

*Dose*.— $\frac{1}{4}$  or  $\frac{1}{2}$  mil increased to 4 mls (5 or 10 to 60 minims).

*NOTES*.—Gynocardia oil is official in India and the Eastern Colonies. Gynocardic acid (dose, 3 to 12 centigrams) and magnesium gynocardate (dose, 6 to 18 centigrams) are given internally in leprosy, usually in pills or enclosed in capsules.

**OLEUM HEDEOMÆ.**

## OIL OF HEDEOMA.

*Synonym.*—American Pennyroyal Oil.

Oil of hedeoma is obtained by distillation from the herb *Hedcoma pulegioides*, Pers. (N.O. Labiatae), indigenous to North America.

It occurs as a pale yellow, limpid liquid, having a characteristic sweetish, mint-like odour, and an aromatic taste. Soluble in 70 per cent. alcohol (1 in 2). Specific gravity, 0.925 to 0.940 (0.920 to 0.935 at 25°). Optical rotation, +18° to +22°.

The chief constituent of the oil is pulegone,  $C_{10}H_{16}O$ , a liquid ketone identical with that from oil of *Mentha Pulegium*, boiling at 221°, and having a specific gravity of 0.936. It also contains two ketones,  $C_{10}H_{18}O$ , one boiling at 168° to 171°, the other at 206° to 209°, the latter possibly identical with menthone. Formic, acetic, and isoheptoic acids are also found in the oil. The latter is so similar to the oil obtained from *Mentha Pulegium*, Linn., that it is frequently substituted for the latter. Adulteration with petroleum, oil of turpentine, and other essential oils can be detected by the solubility in alcohol.

Oil of hedeoma has properties resembling those of *Oleum Pulegii*. It is given on sugar, or in hot water, as an emmenagogue.

*Dose.*— $\frac{1}{4}$  to 2 decimils (1 to 3 minims).

**OLEUM JUNIPERI.**

## OIL OF JUNIPER.

Oil of juniper is obtained by distillation from the full-grown, unripe, green fruit or "berries" of *Juniper communis*, Linn. (N.O. Coniferæ), a tree which is indigenous to Great Britain, and distributed widely over Europe. The oil distilled in England consists of the entire distillate from the fruit, but there is reason to believe that foreign distilled oil consists of the lighter portions only.

The oil occurs as a colourless or pale greenish-yellow, limpid liquid, possessing a peculiar terebinthinate odour when fresh, and a balsamic, burning, somewhat bitter taste. Old oil is somewhat viscid, has an acid reaction, and a more or less rancid odour. Soluble with slight turbidity in alcohol (1 in 20), also in 95 per cent. alcohol (1 in 4), and miscible with an equal volume of absolute alcohol, but becoming opalescent if more be added. The solubility decreases with age. Soluble in all proportions of chloroform, carbon bisulphide, benzene, and amylic alcohol. Specific gravity, 0.865 to 0.890 (0.860 to 0.880 at 25°), these figures being raised by exposure owing to gradual resinification. Rotation, never exceeding  $-10^\circ$ , almost invariably lævo-rotatory, and usually about  $-4^\circ$  to  $-6^\circ$ .

The chief constituents of the oil are the terpene pinene,  $C_{10}H_{16}$ , and the sesquiterpene cadinene,  $C_{15}H_{24}$ ; juniper camphor, a crystalline

body, probably belonging to the series of terpene alcohols; an ester, boiling about  $180^{\circ}$ . The peculiar odour of the oil is not due to esters, since the oil retains its characteristic odour after saponification. The relative proportions of pinene and cadinene may be ascertained by fractionation. Pinene boils at  $156^{\circ}$ , cadinene at  $274^{\circ}$ . From 25 to 35 per cent. of pinene is obtained between  $155^{\circ}$  and  $160^{\circ}$ , and 10 to 20 per cent. of cadinene between  $270^{\circ}$  and  $280^{\circ}$ . Alcohol as an adulterant lowers the specific gravity, and may be detected by collecting the first few drops on distillation, and applying the iodoform test. Other possible adulterants of the oil are oil of turpentine, juniper wood oil, and oil of turpentine distilled with juniper berries. Commercial oil of juniper is obtained chiefly from the ripe fruit, and is stated to be in all essential qualities superior to the oil from the unripe green berries.

Oil of juniper has properties resembling those of oil of turpentine. It is employed chiefly as a stimulating diuretic in cardiac and hepatic dropsy, but it should not be given when there is disease of the kidneys. It may be given on sugar, or as *Spiritus Juniperi*.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM LAVANDULÆ.

### OIL OF LAVENDER.

*Synonyms*.—*Oleum Lavandulæ Florum*; Oil of Lavender Flowers.

Oil of lavender is obtained by distillation from the flowers of *Lavandula vera*, DC. (N.O. Labiata), a plant cultivated in England, France, and other countries.

It occurs as a pale yellow, yellowish-green, or nearly colourless liquid, having the fragrant odour of the flowers, and a pungent, slightly bitter taste. Soluble in all proportions of alcohol and absolute alcohol; should dissolve in three volumes of 70 per cent. alcohol, forming a clear solution (absence of turpentine); sparingly soluble in 60 per cent. alcohol. Specific gravity, 0.885 to 0.900 ( $0.880$  to  $0.892$  at  $25^{\circ}$ ). Rotation  $-5^{\circ}$  to  $-10^{\circ}$ .

The chief constituents of the oil are the alcohol linalool,  $C_{10}H_{18}O$ , and its acetic ester, linalyl acetate,  $C_{12}H_{20}O_2$ , of which there is 7 to 10 per cent. in the English oil, and 25 to 40 per cent. in the French oil. Other constituents are pinene,  $C_{10}H_{16}$ ; limonene,  $C_{10}H_{16}$ ; geraniol,  $C_{10}H_{18}O$ , and a sesquiterpene,  $C_{15}H_{24}$ . Cineol,  $C_{10}H_{18}O$ , is found in some quantity in English oil, but only in traces in French oil. English oil, which undoubtedly has the finest odour, contains but little linalyl acetate, but the fineness and value of French oils appear to stand in direct ratio to the amount of linalyl acetate present. The English oil is sometimes described as being easily distinguishable from the French by its cineol-like odour, and this is readily understood when it is remembered that the former contains an appreciable quantity of cineol. The usual adulterants of oil of lavender are



the oils of spike and turpentine. Neither contains appreciable quantities of esters, so that in the case of suspected samples the ester determination supplies useful information on this point. Oil of spike (*L. Spica*, Cav.) is slightly dextro-rotatory, and therefore diminishes the rotatory power. American turpentine has the same effect. French turpentine, on the other hand, increases the lævo-rotation. Oil of turpentine further decreases the specific gravity and the solubility in 70 per cent. alcohol. Oil of spike does not influence the solubility but decreases the ester content. A large cineol content in the French oil indicates adulteration with oil of spike. Ethyl succinate has also been used as an adulterant.

Oil of lavender has the aromatic and carminative properties of the volatile oils generally. It is not much employed internally other than as a flavouring agent; the oil or the spirit of lavender may be given on sugar in flatulence and colic; red lavender lozenges are employed as a mild stimulant and for their pleasant taste; compound tincture of lavender is a useful colouring and flavouring for mixtures. Oil of lavender is largely employed in perfumery, and is occasionally useful in pharmacy to cover disagreeable odours in ointments and other compounds. The oil is reputed to be objectionable to midges and mosquitoes, and is therefore smeared on exposed parts of the skin to prevent insect bites.

*Dose.*— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM LIMONIS.

### OIL OF LEMON.

Oil of lemon is obtained by mechanical means from the fresh peel of the fruit of *Citrus Medica*, Linn., var.  $\beta$ -*Limonum*, Hook. f. (N.O. Rutaceæ), a small tree, probably a native of India, cultivated in all countries bordering on the Mediterranean, especially in Sicily, Southern Italy, Spain, the Riviera, etc.

It occurs as a pale yellow liquid, having the pleasant, fragrant odour of fresh lemons, and an aromatic, mild, somewhat bitter after-taste. Soluble in alcohol (1 in 12), clear solubility often being prevented by gummy and vegetable wax-like constituents; in all proportions of absolute alcohol, ether, chloroform, benzol, amylic alcohol, and glacial acetic acid; solutions in carbon bisulphide and benzene are usually somewhat cloudy on account of a little water contained in the oil. Specific gravity, 0.857 to 0.862 (0.851 to 0.855 at 25°). Rotation, +59° to +64°, occasionally up to +66°.

The constituents of oil of lemon present in greatest abundance are the terpenes, d-limonene chiefly, and l-limonene,  $C_{10}H_{16}$ , together forming about 90 per cent. of the bulk of the oil. Traces of phellandrene and a sesquiterpene are present, but no pinene. The valuable portion of the oil is the remaining 10 per cent., consisting of oxygenated bodies, chiefly the aldehyde citral,  $C_{10}H_{16}O$ , to which the odour of the oil is largely due, and of which there is from 5 to 7 per cent. present in the oil. It has a

flavouring power nearly fifteen times greater than the oil; specific gravity, 0.895 to 0.899; boiling-point,  $224^{\circ}$  to  $228^{\circ}$ ; on reduction it yields the alcohol geraniol. Other oxygenated constituents are citronellal,  $C_{10}H_{18}O$ , geranyl acetate,  $C_{12}H_{20}O_2$ , about 1 per cent., and, in Palermo oil, linalyl acetate,  $C_{12}H_{20}O_2$ . From the stearopten found in the oil two crystalline substances have been isolated, one a yellow crystalline body  $C_{14}H_{14}O_6$ , melting-point,  $115^{\circ}$ ; the other a white crystalline powder,  $C_{10}H_{10}O_4$ , melting-point,  $144^{\circ}$ . Adulteration with turpentine oils, French and American, both of which decrease the rotatory power, may be approximately estimated by calculating from the rotation figures, provided it is known which variety of turpentine has been used; turpentine may also be detected in the first fraction of about 10 per cent., since pinene, its chief constituent, boils at  $156^{\circ}$ , whereas pure lemon oil begins to boil at about  $173^{\circ}$ . Other forms of adulteration, however, are exceedingly difficult of detection, such as mixtures of turpentine and low-grade orange oils, waste terpene with orange oil, and sometimes with citral obtained from lemon grass oil. Determination of the citral at the best can only give approximate results, and is moreover no proof of the genuineness of the oil. Ethyl alcohol as an adulterant may be detected by shaking with water, when a diminution in volume would indicate alcohol. The oil should evaporate from paper without leaving any stain (absence of fixed oils). The most satisfactory method of examination is to slowly distil the oil, when the first 10 per cent. of distillate should have a rotatory power not differing from that of the original oil by more than  $3^{\circ}$ .

Oil of lemon has the stimulant and carminative properties of the volatile oils generally. It is, however, seldom employed for its medicinal properties, but almost entirely as a flavouring agent.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

NOTE.—As the aroma and flavour of oil of lemon deteriorate by keeping, it has been recommended that it should be mixed whilst new with one-tenth of its volume of absolute alcohol.

## OLEUM LINI.

### LINSEED OIL.

Linseed oil is obtained by expression, at ordinary temperatures, from the dried ripe seeds of the flax plant, *Linum usitatissimum*, Linn. (N.O. Linææ), cultivated almost universally in temperate and tropical regions, chiefly Russia, India, United States, Canada, and Argentina.

It occurs, when freshly prepared, as a viscid, yellow liquid, having a faint but distinct odour and a bland taste. The commercial oil, however, has a marked odour and often an acrid taste, due to oxidation from exposure to the air. Insoluble in alcohol, slightly soluble in absolute alcohol (1 in 40), soluble in all proportions of turpentine, ether, chloroform, and carbon bisulphide, forming clear solutions. Specific gravity, 0.930 to 0.940 ( $0.925$  to  $0.935$  at  $25^{\circ}$ ).

Saponification number, 187 to 195. Iodine value, not less than 170. The oil should not congeal above  $-20^{\circ}$ , and should only slightly redden moistened blue litmus paper.

The chief constituent of the oil is linolein, a mixture of the glycerides or glyceryl esters of linolic, linolenic, and isolinolenic acids, three isomeric bodies possessing similar physical properties and sometimes described generally as linoleic acid. Other constituents are olein, stearin, palmitin, and myristin—the glycerides or glyceryl esters of oleic, stearic, palmitic, and myristic acids. Freedom from non-drying oils, which may be present as adulterants, is indicated by the oil thickening on exposure to air, a thin layer spread on glass forming a hard, transparent varnish. It should be completely saponifiable by alcoholic potassium hydroxide, and the resulting soap should be completely soluble in water without leaving an oily residue (absence of mineral oil and rosin oil). If 2 mils of the oil be warmed and shaken in a test-tube with an equal volume of glacial acetic acid, and, after cooling,  $\frac{1}{2}$  decimil of sulphuric acid added, a greenish colour should be produced (a violet colour under these circumstances would indicate the presence of resin or resin oil). For medicinal purposes recently expressed linseed oil is preferable. It has been used internally as a laxative (dose, 30 mils, 1 fluid ounce), but its taste is disagreeable. A rectal injection of 60 mils (2 fluid ounces) of the oil night and morning has been highly recommended for piles. It is applied externally as a soothing application for burns, especially in the form of carron oil (see *Linimentum Calcis cum Oleo Lini*). Linseed oil is largely used in the arts for its properties as a drying oil.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

*NOTE.*—Refined linseed oil is prepared by treating linseed oil with 1 to 2 per cent. of concentrated sulphuric acid; the charred mass carries down with it the bulk of the impurities contained in the crude oil.

## OLEUM LUBRICANS.

### CATHETER OIL.

*Synonym.*—Lund's Oil.

Carbolic Acid	...	...	...	...	5.00
Castor Oil	...	...	...	...	20.00
Almond Oil, sufficient to produce	...	...	...	...	100.00

Dissolve the carbolic acid in the mixed oils.

This oil is used to lubricate catheters. *Pasta Lubricans* is used for the same purpose, and is sometimes preferred, as it can be removed by water, and does not attack the material of which the catheter is composed.

## OLEUM MENTHÆ PIPERITÆ.

### OIL OF PEPPERMINT.

Oil of peppermint is obtained by distillation from the fresh, flower-



ing peppermint, *Mentha piperita*, Sm. (N.O. Labiatae), a plant found growing wild throughout Europe, and cultivated in England, France, Germany, and America. Both the black and white varieties are used, the former yielding more oil than the latter, but of a less delicate aroma.

It occurs as a colourless, pale yellow or greenish-yellow liquid when recently distilled, but becomes darker and thicker on keeping, and has the characteristic odour of the herb, and a strong aromatic taste followed by a sensation of coldness in the mouth caused by the menthol it contains. Soluble in alcohol (2 in 1), the solution becoming turbid on adding more of the solvent; soluble in all proportions of absolute alcohol. Specific gravity, 0.900 to 0.920 (0.894 to 0.914 at 25°); rotation,  $-18^{\circ}$  to  $-33^{\circ}$ .

The chief constituent of the oil is menthol, but it also contains menthyl acetate,  $C_{12}H_{22}O_2$ , and isovalerate, together with menthone  $C_{10}H_{18}O$ , cineol, inactive pinene, l-limonene, cadinene, phellandrene, acetic aldehyde and acid, isovaleric aldehyde and acid, amylic alcohol, and dimethyl sulphide. On cooling to a low temperature, separation of menthol occurs, especially if a few crystals of that substance be added to start crystallisation. The English oil contains 60 to 70 per cent. of menthol, the American oil less, while the Japanese and Chinese oils (specific gravity, 0.895 to 0.905) obtained from *Mentha arvensis*, DC., var. *piperascens et glabrata*, Holmes, are the richest of all in menthol, sometimes containing 85 per cent. The oil of *Mentha piperita* may be distinguished as a rule from that of *Mentha arvensis* by the following colour reaction:—Two decimils of American or English peppermint oil mixed with 1 mil of glacial acetic acid will produce a blue colouration after a few hours, reaching its maximum intensity in about twenty-four hours. By reflected light a reddish or copper-coloured fluorescence will be noticed. Japanese oil does not give this reaction, the mixture remaining colourless. It is due to a nitrogen-free volatile body in the oil, and is considered an oxidation phenomenon. Oil which has been much exposed to sunlight will not give the reaction. Besides the specific gravity and optical rotation the only really useful methods of analysis are the determination of the menthol both free and as esters, and of the menthone, the latter by reducing it to menthol by means of sodium in a hot solution of the oil in alcohol. Adulteration with dementholised oil, known as menthene, is frequently practised. The odour and taste afford a good indication of the quality of the oil, and by this means it is quite possible to distinguish between English, American, and Japanese oils.

Oil of peppermint is an aromatic stimulant, and carminative to the gastro-intestinal tract. It relieves gastric and intestinal flatulence and colic, and is employed with purgatives to prevent griping. The oil may be given on sugar, or as peppermint water or spirit of peppermint in mixtures. It is also added to pills  $\frac{1}{4}$  to 1 minim in each, a little soap being used to facilitate massing if necessary. Oil of peppermint is a local anæsthetic; the Japanese

oil (Po-ho-yo) is employed to relieve toothache and to paint over neuralgic areas.

Oil of peppermint is a mild antiseptic, and is used to flavour dentifrice pastes, powders, and washes.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM MENTHÆ VIRIDIS.

### OIL OF SPEARMINT.

*Synonyms*.—Oleum Menthæ ; Oleum Menthæ Crispæ.

Oil of spearmint is obtained by distillation from fresh, flowering spearmint, *Mentha viridis*, Linn. (N.O. Labiatae), a native of Europe and Asia, cultivated for domestic use as well as for the sake of its oil, most of which is imported from America.

It occurs as a colourless, pale yellow or greenish-yellow liquid when recently distilled, but becomes darker and viscid on keeping ; has the characteristic odour, and warm, slightly bitter taste of the spearmint, the taste being less pungent than that of peppermint. Soluble in its own volume of a mixture of equal parts of alcohol and of absolute alcohol, forming a clear solution ; soluble in about its own volume of alcohol, the solution becoming opalescent on adding more solvent, and in all proportions of absolute alcohol. Specific gravity, 0.920 to 0.940 (0.914 to 0.934 at 25°) ; rotation,  $-30^{\circ}$  to  $-50^{\circ}$ .

The chief constituent of the oil is carvone, which may occur to the extent of about 56 per cent. Boiling-point,  $230^{\circ}$ . Specific gravity, 0.964. It is an unsaturated ketone, having the formula  $C_{10}H_{14}O$ , and is a colourless liquid, smelling strongly of caraway, and solidifying on refrigeration. It combines with hydrogen sulphide to form a crystalline addition compound, but not with bisulphites. Besides carvone, an alcohol, l-limonene and l-pinene have been found, and in Russian spearmint oil, said to be a product of *M. aquatica*, carvone, linalool, cineol, and l-limonene. The constituent to which the odour of the oil is due is not known, indeed very little is known about the composition of the oil.

The properties of oil of spearmint resemble those of peppermint oil, but its flavour is less agreeable.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

## OLEUM MORRHUÆ.

### COD-LIVER OIL.

*Synonym*.—Oleum Jecoris Aselli.

Cod-liver oil is extracted from the fresh liver of the cod, *Gadus Morrhua*, Linn. (Order Teleostei), by the application of low-pressure steam at a temperature not exceeding  $82^{\circ}$ , after which it is cooled to  $-5^{\circ}$ , and the frozen mass submitted to pressure in canvas bags, the purified oil being forced through the canvas and a whitish tallow-

like mass of so-called "stearine," and liver debris being left in the bags. The product is known as "non-freezing" oil, because it does not readily become turbid when exposed to low temperatures.

It occurs as a pale yellow, thin, oily liquid, with a slight fishy, but not rancid odour, and a bland, slightly fishy taste. Inferior or old oils are liable to be dark coloured, acrid or bitter, unduly acid, and more or less rancid. Very slightly soluble in alcohol, readily soluble in chloroform and in carbon bisulphide, in ether (1 in 2), in acetic ether (about 1 in 4). Specific gravity, 0.920 to 0.930 (0.918 to 0.922 at 25°); refractive index, 1.4800; iodine value about 167; saponification value about 188. The oil should be only slightly acid to litmus paper previously moistened with alcohol, and, as upon the acidity also depends the presence or absence of albumen, absence of free fatty acids is shown by the separation of albumen on adding nitric acid (specific gravity, 1.420) to the oil, a precipitate of coagulated albumen being formed at the point of contact of the two liquids.

The chief constituents of the oil are jecolein and therapin, the glycerides of jecoleic acid,  $C_{19}H_{36}O_2$ , and therapeutic acid,  $C_{17}H_{34}O_2$ ; other constituents are palmitin, the glycerides of one or more unknown acids, and traces of cholesterol, alkaloidal bodies (aselline, morrhaine, etc.), bile acids and iodine, while the glycerides of acetic, butyric, valeric, and capric acids sometimes occur as secondary products in oil of inferior quality, owing to putrefaction of the livers. Jecoleic acid is a very unstable compound belonging to the same series as oleic acid, and is probably isomeric with doeglic acid. Minute quantities of iron, manganese, magnesium, calcium, and sodium have been identified in the oil. On distillation with ammonia, cod-liver oil yields trimethylamine, being thus distinguished from other fixed oils used in medicine. It is officially stated that cod-liver oil may be distinguished from seal oil or vegetable oils by the violet colouration produced by the addition of a drop of sulphuric acid (specific gravity, 1.843) to a few drops of the oil on a porcelain slab, the presence of cholesterol being thus indicated, but the colour is not always produced. Adulteration with other fish oils or vegetable oils is shown by the separation of solid fat on cooling to 0° for two hours. Oils from other species of *Gadus* have analogous properties to cod-liver oil, and are difficult to detect when mixed with it, being distinguishable only by odour and taste. Adulteration with mineral oil is readily ascertained by a determination of the saponification value, and of unsaponifiable matter, which should not exceed 1.5 per cent. Cod-liver oil absorbs a considerable amount of oxygen on exposure to the air, and becomes thicker, though without drying. Hence the presence of any notable quantity of linseed oil would be indicated by the film test. If 5 centimils of cod-liver oil be dissolved in 1 mil of chloroform, and the solution shaken with 5 centimils of sulphuric acid, it will acquire a violet-red tint, rapidly changing to rose-red, and finally, brownish-yellow. If about 1 decimil of fuming nitric acid be allowed to come gradually into contact with about 5 decimils of the oil, contained in a watch-glass



a red colour will be produced where the liquids meet. On stirring the mixture with a glass rod, this colour becomes bright rose-red, soon changing to lemon-yellow (distinction from seal oil, which shows at first no change of colour, and from other fish oils, which become at first blue and afterwards brown and yellow).

Cod-liver oil is a food rather than a drug, and is the most easily assimilable of all fats. It increases weight and improves the general condition of the patient, being often well borne by those who are unable to digest other fats. It is employed to improve nutrition in all wasting diseases such as tuberculosis, scrofula, and rickets. In the malnutrition of children, small doses taken after each meal are of the greatest service. It is best given in the cold months of the year, as a distaste for the oil frequently arises in the summer months. It should not be given when there is diarrhœa. For young infants the oil is sometimes applied by inunction with good results. Cod-liver oil may be given in the form of emulsion (see *Emulsio Olei Morrhuæ*) or as *Extractum Malti cum Oleo Morrhuæ* when its oily character causes nausea. Emulsions are also prepared with the hypophosphites of lime and soda for use in phthisis. Capsules of cod-liver oil are prepared containing 1 to 4 mils in each,

*Dose*.—4 to 16 mils (1 to 4 fluid drachms).

NOTES.—On the now abandoned assumption that ready absorption of cod-liver oil was due to a large proportion of free acid present, substitutes consisting of vegetable oils with the addition of oleic acid have been suggested. Lipanin is a mixture of olive oil with 6 per cent. of oleic acid. *Morrhuoil* is an alcoholic extract of cod-liver oil, containing the bases without the fatty glycerides.

## OLEUM MYRISTICÆ.

### OIL OF NUTMEG.

*Synonym*.—Oil of *Myristica*.

Oil of nutmeg is obtained by distillation from the powdered seeds of *Myristica fragrans*, Houtt. (N.O. *Myristicaceæ*), a tree indigenous to the Molucca, Banda, and Sunda Islands, cultivated there and also in other countries.

It occurs as a mobile, pale yellow, or nearly colourless liquid, becoming viscid with age, and having the characteristic odour of nutmeg, with a warm spicy taste. Soluble in alcohol (1 in  $4\frac{1}{2}$ ), in all proportions of absolute alcohol, sparingly soluble in 60 per cent. alcohol; should form a clear solution with its own volume of a mixture of equal parts of alcohol and absolute alcohol; on evaporating a little of this alcoholic solution on a water-bath and then cooling there should be no crystalline residue left, thus showing absence of concrete or fixed oil of nutmeg, which is sometimes carried over during the process of distillation. Specific gravity, 0.865 to 0.920 (0.862 to 0.910 at 25°); rotation, +14° to +28°.

The oil has been the subject of many contradictory statements regarding its composition; but it appears to consist almost entirely of terpenes, d- and l-pinene, together with dipentene, an oxygenated body named myristicol, myristic or myristicinic acid, and a

phenol-like substance. The presence of myristicin is doubtful. On distillation, about 60 per cent. of the oil passes over below  $180^{\circ}$ . Oil of nutmeg closely resembles oil of mace in all its properties, and is scarcely distinguishable from it; frequently no commercial distinction is made between them.

Oil of nutmeg has the carminative properties of other volatile oils, and is used as a flavouring agent. It is given on sugar or as *Spiritus Myristicæ*, and is added to purgative pills to prevent griping. It is mildly counter-irritant, and is sometimes used in liniments and hair lotions. After absorption, oil of nutmeg has greater stimulant properties on the cerebral cortex than the other oils except absinthe. Large doses may induce epileptiform convulsions.

*Dose*.— $\frac{1}{4}$  to 2 decimils ( $\frac{1}{2}$  to 3 minims).

*NOTE*.—Expressed oil of nutmeg or mace (*Adeps Myristicæ*) is a concrete oil of a pale orange colour, obtained from nutmegs by expression with heat; it is a mild stimulant applied externally, and is sometimes employed in plasters and hair lotions.

## OLEUM NEROLI.

### OIL OF NEROLI.

*Synonyms*.—Oil of Orange-flower; *Oleum Aurantii Floris*.

Oil of neroli is obtained by distillation with water from the fresh blossoms of the bitter orange tree, *Citrus Aurantium* var. *Bigaradia*, Hook. f. (N.O. Rutacæ), and is produced in Southern France.

It occurs as a pale yellow liquid, slightly but distinctly fluorescent, becoming brownish-red on exposure to light, with an intense and pleasant odour of orange blossoms and a bitter aromatic taste. Soluble in one and a-half to two volumes of 80 per cent. alcohol, becoming turbid on the addition of more of the alcohol. On standing, a paraffin hydrocarbon separates in crystalline flakes and collects on the surface. The alcoholic solution has a fine, violet-blue fluorescence. The oil itself, when exposed to low temperatures, becomes turbid and occasionally solid from separation of paraffin. Specific gravity, 0.870 to 0.880; rotation,  $+1^{\circ} 30'$  to  $+5^{\circ}$ .

The constituent to which the distinguishing features (odour and fluorescence) of the oil are due, is the methyl ester of anthranilic acid,  $C_6H_4(NH_2)COOCH_3$ , which occurs in small quantity. Its odour in the undiluted state is disagreeable, but, in largely diluted solutions, is very pleasant. Other constituents are l-linalool ( $C_{10}H_{18}O$ ), linalyl acetate ( $C_{12}H_{20}O_2$ ), 7 to 18 per cent.; geraniol ( $C_{10}H_{18}O$ ), limonene ( $C_{10}H_{16}$ ), and a stearopten, called neroli camphor, which is odourless and tasteless when pure, and melts at  $55^{\circ}$ . The saponification number of good oil lies between 20 and 52.

The most frequent adulterants are the oils of bergamot and petit-grain which, consisting chiefly of the same constituents as neroli oil, are difficult, if not impossible, of detection, unless they be present in large quantities, when the specific gravity and ester content are increased. The odour alone is a helpful guide in the valuation of the oil.

Oil of neroli is largely employed in perfumery. The watery distillate obtained in its preparation constitutes the orange-flower water of commerce.

### OLEUM OLIVÆ.

#### OLIVE OIL.

Olive oil is obtained by expression from the ripe fruit of *Olea europæa*, Linn. (N.O. Oleaceæ), a small tree cultivated in Spain, France, Italy, and other countries bordering on the Mediterranean, also in California and South Australia.

It occurs as a pale yellow or greenish-yellow liquid, with a faint, peculiar odour, a nut-like taste, and a faintly acrid after-taste. Partially soluble in alcohol, soluble in ether (1 in 2), readily soluble in chloroform and in carbon bisulphide. Specific gravity, 0.914 to 0.919 (0.910 to 0.915 at 25°); saponification value, 185 to 196; iodine value, 79 to 88; unsaponifiable matter, 0.46 to 1.0 per cent.; solidifying point —6° to +2°.

The chief constituent of the oil is olein, the glyceride of oleic acid, which constitutes about 93 per cent. of the portion which remains liquid when cooled to very low temperatures; the remaining 7 per cent. consists partly of linolin, the glyceride of linolic acid. The oil contains no stearin. The part which congeals consists of palmitin and arachin, the glycerides of palmitic and arachic acids, the arachin being present in very small proportion. Phytosterol and free fatty acid are also usually present in small quantity in the oil, the proportion of free acid being considerable in the case of inferior, old, or rancid oil. The green colouration of some oils is due to chlorophyll. Exposed to the air the oil loses colour and becomes rancid, acquiring a disagreeable smell, sharp taste, and a thicker consistence, the changes being promoted by heat and accompanied by a large increase in the quantity of fatty acid present in the oil. When heated to 120° it becomes lighter in colour; at 220° it becomes nearly colourless, and at the same time rancid; at 315° it is decomposed. Olive oil may be adulterated with cotton-seed oil, earth-nut oil, sesame, poppy-seed, and other oils, all of which are less readily congealed than olive oil. Oils of high specific gravity usually exhibit a dark colour. If the specific gravity of a pale oil be found higher than 0.917 it may be looked upon with suspicion as possibly adulterated with sesame, cotton-seed, or poppy-seed oils. Admixture with rape oil tends to lower the specific gravity. Since olive oil has a lower iodine value than any other oil that might be used as an adulterant, this figure constitutes a most valuable means of detecting adulteration, any admixture with poppy-seed oil and, to a lesser extent, with sesame, cotton-seed, and rape oils, distinctly increasing the iodine number. Any considerable addition of rape oil would lower the saponification number materially. When cooled to 10° olive oil tends to deposit solid fat and assume a pasty consistence, and it becomes



a nearly solid, granular mass at  $0^{\circ}$ . Olive oil which does not congeal is the product of over-ripe fruit. If shaken vigorously with an equal volume of nitric acid (specific gravity, 1.370), olive oil should retain a light yellow colour, not becoming orange or reddish-brown, and after standing for six hours should change into a yellowish-white solid mass and an almost colourless liquid (absence of appreciable quantities of cotton-seed oil and most other seed oils). If 2 mls of the oil be mixed in a test-tube with 2 mls of equal volumes of amylic alcohol and carbon bisulphide containing 1 per cent. of sulphur in solution, and the test-tube be immersed in boiling water, no reddish colour should develop within a period of ten to fifteen minutes (absence of cotton-seed oil). If 2 mls of the oil be mixed with 1 mil of hydrochloric acid (specific gravity, 1.18) containing 1 per cent. of sugar, the mixture shaken for half a minute and allowed to stand for five minutes, then 3 mls of water added and the whole again shaken, the acid layer should not show a pink colour (absence of sesame oil). Good oil should not contain more than 1 per cent. of free acid, calculated as oleic acid.

Olive oil is nutritious, demulcent, and from its lubricating action on the bowels, mildly laxative. It has been recommended for use in place of cod-liver oil as a nutritive; it may be taken without preparation or in the form of capsule or emulsion, the latter being prepared with acacia gum equal to one-third the weight of olive oil. For gall-stones or as a laxative, 4 to 8 ounces or more of olive oil are taken daily. It is administered freely as an antidote in poisoning by corrosive substances. Externally, olive oil is emollient and soothing to inflamed surfaces; it may be applied freely to burns alone or mixed with an equal quantity of lime water. It is applied to the skin to remove incrustations in eczema and psoriasis, and is used as a lubricant in massage. Large quantities (5 to 20 ounces) are injected *per rectum* in constipation and to remove impacted fæces. Sterilised olive oil is injected hypodermically as a nutrient (1 to 2 fluid drachms). Olive oil is largely employed in pharmacy, in the preparation of liniments, ointments, plasters, etc.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce), or more.

## OLEUM PETROSELINI.

OIL OF PARSLEY.

*Synonyms.*—Parsley Oil; Parsley Seed Oil.

Oil of parsley is obtained by distillation from the fruit of parsley, *Carum Petroselinum*, Benth. et Hook., Linn. (N.O. Umbelliferæ), cultivated in nearly all temperate climates.

It occurs as a colourless or yellowish, thick liquid, having an odour different from that of the herb. Specific gravity, 1.050 to 1.100; rotation  $-5^{\circ}$  to  $-10^{\circ}$ .

The chief constituent of the oil is apiol, a stearopten having the formula  $C_{11}H_{14}O_4$ , which separates in crystals on cooling the oil to a

low temperature. The oil obtained from German fruit contains this body in considerable quantity, and consequently becomes semi-solid at ordinary temperatures; that obtained from French fruit is much poorer in apiol. The terpene fraction of the oil boils at  $160^{\circ}$  to  $164^{\circ}$ , has a specific gravity of about 0.865, and rotation  $-30.8^{\circ}$ ; l-pinene is therefore probably a constituent of the oil.

Oil of parsley has properties similar to those of apiol, as described in the monograph on that substance.

*Dose.*—2 to 3 decimils (3 to 5 minims).

### OLEUM PHOSPHORATUM.

#### PHOSPHORATED OIL.

Phosphorus, dry	...	...	...	...	1.00
Almond Oil, by weight	...	...	...	...	99.00

Dissolve the dry phosphorus in the almond oil after the latter has been freed from air and moisture by heating it to about  $149^{\circ}$ , keeping it at that temperature for fifteen minutes, and filtering it through paper when cool. The phosphorus and almond oil should be placed in a stoppered bottle of suitable size, which is then immersed in hot water until the temperature of the mixture is  $82^{\circ}$ , and shaken until solution is complete. The stopper of the bottle must be removed at intervals to allow the expanded air to escape.

Phosphorated oil is a stable and active form in which to administer free phosphorus, the oil being enclosed in a capsule, or mixed with almond oil or cod-liver oil.

*Dose.*— $\frac{1}{2}$  to 3 decimils (1 to 5 minims).

### OLEUM PICIS LIQUIDÆ.

#### OIL OF TAR.

Oil of tar is obtained by the distillation of wood tar, and consists of hydrocarbons and phenols.

It occurs when freshly distilled as a colourless liquid, but becomes yellowish to reddish-brown in colour on exposure to air. It has a strong tarry odour and taste. Soluble in alcohol, the solution having an acid reaction on litmus paper. Specific gravity, about 0.970 (0.965 at  $25^{\circ}$ ).

Oil of tar has the properties of wood tar in a less objectionable form. It is employed as an inhalation with hot water in chronic catarrhal affections, and is given with syrup and glycerin as a pulmonary antiseptic in phthisis. It is also occasionally used as an anthelmintic and intestinal antiseptic. Externally, it is used as an antiseptic and stimulant in eczema and other skin diseases.

*Dose.*— $\frac{1}{2}$  to 3 decimils (1 to 5 minims).

NOTE.—Creosote is known in some districts as oil of tar.

**OLEUM PICIS RECTIFICATUM.**

RECTIFIED OIL OF TAR.

*Synonyms.*—Light Oil of Tar ; Spirit of Tar.

Rectified oil of tar is obtained by redistillation of oil of tar from the brown resinous bodies which are formed in it by oxidation. The distillate is treated with soda-lye to remove creosote, and redistilled, this treatment being repeated several times.

The product is a mobile, colourless, highly refracting oil, which tends to become sherry-coloured on keeping. Specific gravity, 0·840 to 0·870.

Rectified oil of tar is a powerful deodoriser. It is used in the preparation of Coster's paste (*Pigmentum Iodi et Olei Picis*), by carefully mixing 4 of the oil with 1 of iodine, and applying heat if necessary.

**OLEUM PIMENTÆ.**

OIL OF PIMENTO.

*Synonym.*—Allspice Oil.

Oil of pimento is obtained by distillation from the dried, full-grown, unripe fruit of *Pimenta officinalis*, Lindl. (N.O. Myrtaceæ), a tree which is indigenous to the West Indies, Mexico, and South America, and cultivated largely in Central America and Jamaica.

It occurs as a yellow or yellowish-red liquid, becoming gradually darker on keeping, and having a pleasant aromatic odour somewhat similar to that of oil of cloves, and a pungent, spicy taste. Soluble in all proportions of alcohol; in 70 per cent. alcohol (1 in 2), forming a clear solution; in 60 per cent. alcohol (1 in 50). Specific gravity, 1·040 to 1·055 (1·033 to 1·048 at 25°); rotation, lævo-rotatory, never exceeding  $-4^{\circ}$ , more usually about  $-2^{\circ}$ .

The chief constituent of the oil is the phenol eugenol,  $C_{10}H_{12}O_2$ , which is present to the extent of 65 per cent. or more, and a sesquiterpene whose exact nature has not yet been ascertained. The clove-like odour of the oil is doubtless due to the eugenol, but the characteristic odour is due to some other substance or substances as yet unknown. A certain amount of resin is also present, but the oil has not been fully investigated. The specific gravity to some extent indicates the amount of eugenol present. If lower than 1·040, it may be assumed that some eugenol has been removed, or that the oil has been adulterated with substances having a lower specific gravity than that of eugenol. The eugenol may be determined by shaking the oil with solution of potassium hydroxide, as described under *Oleum Caryophylli*, and measuring the residual oily layer, or by Thom's process, a method based on the conversion of eugenol into benzoyl eugenol. At least 65 per cent. of eugenol should be present. An alcoholic solution gives with very dilute solution of ferric chloride a fine indigo blue colouration. On shaking the oil with an equal volume of strong solution of ammonia it is converted into a semi-solid mass. This reaction and the previous one are also given by oil of cloves.



Oil of pimento resembles oil of cloves in its properties, and is used as a carminative to the intestinal tract and as an adjuvant to aperient medicines.

*Dose*.— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

### OLEUM PIMENTÆ FOLIÆ.

OIL OF PIMENTO LEAVES.

*Synonyms*.—Oleum Myrciæ; Oil of Bay.

Oil of pimento leaves is obtained by distillation from the leaves of *Pimenta acris*, Wight (N.O. Myrtaceæ), and probably other closely allied species, plants flourishing in the West Indies, especially St. Thomas, Jamaica, etc. The oil is distilled into water, where it separates into two portions—a light fraction, distilling over rapidly, and a heavy fraction distilling more slowly, the former floating on the top of the water, the latter sinking. These are mixed to obtain a normal oil.

It occurs as a yellow liquid, soon becoming brown on exposure to the air, having a pleasant, characteristic odour, and a sharp, spicy taste. Soluble, when freshly distilled, in an equal volume of alcohol forming a clear solution. On keeping, however, the oil becomes less soluble, and it then gives only turbid mixtures with alcohol. This is due to polymerisation of an olefinic terpene, myrcene, contained in the oil. Specific gravity, 0.965 to 0.995; higher figures point to adulteration with clove or pimento oil. Slightly lævotatory, up to  $-2^{\circ}$ .

The following constituents are present in the oil:—Eugenol,  $C_{10}H_{12}O_2$ ; myrcene,  $C_{10}H_{16}$ ; chavicol,  $C_9H_{10}O$ ; methyl eugenol,  $C_{11}H_{14}O_2$ ; methyl chavicol,  $C_{10}H_{12}O$ ; 1-phellandrene,  $C_{10}H_{16}$ ; citral,  $C_{10}H_{16}O$ ; the phenols to the extent of 59 to 65 per cent. Myrcene, on treatment with glacial acetic acid and sulphuric acid, yields dipentene and an oil of a lavender-like odour, which yields linalool after saponification, identified by its conversion into citral. Myrcene, therefore, bears the same relation to linalool as camphene to isoborneol, and pinene or dipentene to terpineol. Oil of bay may be adulterated with the oils of cloves and pimento, or occasionally with oil of turpentine. The two former cause increase of specific gravity, and, as the oil contains no pinene, turpentine may be detected in the following manner:—The oil is distilled, and the first 10 per cent. of distillate is mixed with an equal volume of amyl nitrite and two volumes of glacial acetic acid. This mixture is cooled in ice and salt, and a mixture of equal parts of glacial acetic acid and strong hydrochloric acid added drop by drop so long as a blue colour is developed. If pinene be present a white crystalline precipitate of pinene nitrosochloride,  $C_{10}H_{16}NOCl$ , is produced. The presence of 10 per cent. of oil of turpentine may be detected with certainty in this way.

Oil of bay is not employed in medicine, but is used in the preparation of bay rum.

**OLEUM PINI.**

## OIL OF PINE.

Oil of pine is obtained by distillation from the fresh leaves of *Pinus Pumilio*, Haenke (N.O. Coniferæ), chiefly in the Austrian Alps, more especially in the Tyrol.

It occurs as a colourless or faintly yellowish liquid, having a pleasant, aromatic odour, and a pungent taste. About 80 per cent. of the oil is soluble in alcohol (1 in 5), the remainder less soluble. Specific gravity, 0.865 to 0.875; rotation,  $-5^{\circ}$  to  $-10^{\circ}$ .

The chief constituents of the oil are 1-pinene, 1-phellandrene, sylvestrene, dipentene, cadinene, and about 5 to 7 per cent. of bornyl acetate. Not more than 10 per cent. of the oil should distil below  $165^{\circ}$ .

Oil of pine has properties closely resembling those of oil of turpentine. It is employed principally as an inhalation with hot water (see Vapor Olei Pini) for its stimulating and disinfecting action in catarrh of the respiratory passages, chronic laryngitis and bronchitis. It is also used dissolved in almond oil or liquid paraffin, as a spray. The oil is given internally as a disinfectant and "expectorant," being taken on sugar, in capsules, or in the form of pastilles. Applied to the skin, pine oil is rubefacient and mildly counter-irritant, and is used similarly to oil of turpentine. It is rubbed over rheumatic joints, which are then covered with cotton wool, or 1 fluid drachm of the oil may be added to a warm bath.

*Dose.*— $\frac{1}{2}$  to 3 decimils (1 to 5 minims).

*NOTES.*—The oil formerly known as Oleum Pini Sylvestris is not now obtainable. Oil of pine is also known under the trade-names Pinol and Pumiline. An aromatic, brown extract of the fresh leaves of *Pinus Pumilio* is prepared for use in baths in rheumatism.

**OLEUM PULEGII.**

## OIL OF PULEGIUM.

*Synonym.*—Oil of Pennyroyal.

Oil of pulegium or pennyroyal is obtained by distillation from fresh pennyroyal herb, *Mentha Pulegium*, Linn. (N.O. Labiatae), a native of most parts of Europe.

It occurs as a yellow or greenish-yellow liquid, having a strong aromatic, mint-like odour, and an aromatic taste. Soluble in 70 per cent. alcohol (1 in 2 or more, forming a clear solution). Specific gravity, 0.930 to 0.960; rotation,  $+16^{\circ}$  to  $+25^{\circ}$ .

The chief constituent of the oil is the ketone pulegone,  $C_{10}H_{16}O$ , forming about 80 per cent. of the oil. It is a colourless liquid, gradually becoming pale yellow, and has a peppermint-like odour. Its specific gravity is 0.936; boiling-point,  $221^{\circ}$ ; rotation,  $+22.9^{\circ}$ . It is identical with the pulegone obtained from Oleum Hedeomæ. Pulegone may be prepared in a very pure state by forming the bisulphite compound, which separates on shaking the oil, diluted with

one-fourth its volume of alcohol, with solution of sodium bisulphite. It combines with bromine to form a liquid dibromide, and with hydrochloric acid and hydrobromic acid to form crystalline addition products. Reduction with sodium in alcoholic solution yields first the alcohol pulegol,  $C_{10}H_{17}OH$ , then l-menthol,  $C_{10}H_{20}O$ . The isomer, isopulegone, which may be prepared from citronellal, differs from pulegone in not forming a crystalline compound with sodium bisulphite, and in not yielding menthol on reduction with sodium. Isopulegone shaken with barium hydroxide is completely converted into pulegone, identical with the natural substance. Adulteration of oil of pennyroyal with oil of turpentine may readily be detected by the diminished solubility in 70 per cent. alcohol, and also by the lowering of the specific gravity and boiling-point.

Oil of pennyroyal closely resembles, in its properties, other volatile oils. It is given on sugar, or with a draught of hot water, as an emmenagogue. During excretion it mildly irritates the kidneys and bladder, and reflexly excites uterine contractions.

*Dose*.— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

## OLEUM RICINI.

### CASTOR OIL.

Castor oil is obtained by expression from the seeds of *Ricinus communis*, Linn. (N.O. Euphorbiaceæ), a native of India, but now grown in all tropical and subtropical countries. The expression is largely carried out in Italy, Marseilles, London, Hull, etc.; after expression the oil is usually bleached by exposure to sunlight, or by chemical means.

It occurs as a colourless or faintly yellow, viscid liquid, almost odourless, and having a taste at first bland but subsequently acrid and nauseating. It is a fixed oil, which dries very slowly. Soluble in alcohol (1 in  $3\frac{1}{2}$ ), in absolute alcohol, ether, oil of turpentine, and glacial acetic acid, but insoluble in petroleum ether. Specific gravity, 0.958 to 0.966 (0.945 to 0.965 at  $25^{\circ}$ ). Slightly dextro-rotatory, about  $+4^{\circ} 30'$ . Refractive index, 1.4795 to 1.4803. Solidifying point,  $-10^{\circ}$  to  $-18^{\circ}$ . Acidity, not over 1.5 per cent., expressed as oleic acid. Saponification value, 176 to 180. Iodine value, 83 to 86. Acetyl value, about 150. Unsaponifiable matter, 0.30 to 0.37 per cent.

The chief constituent of the oil is ricinolein, a mixture of the glycerides of ricinoleic and isoricinoleic acids; tristearin and the glyceride of dihydroxystearic acid are also present in small quantities. The oil contains no olein or palmitin. Ricinoleic acid,  $C_{18}H_{33}O_3$ , is a viscid oil, and yields ricinelaidic acid, a crystalline body, when acted upon by nitrous acid; similarly, when castor oil is treated with nitrous acid, the ricinolein is converted into ricinelaidin. The oil does not yield a clear mixture with its own volume of petroleum spirit at  $15.5^{\circ}$  (absence of other fixed oils, in the presence of which a perfectly clear solution is formed). The most distinctive features of the oil are its



high specific gravity, behaviour with solvents, its acetyl value, and its very high viscosity. These constants afford a ready means of identification and determination of purity. The specific gravity is the highest of any natural fatty oil. A lower figure than 0.958 would almost certainly indicate adulteration. The acetyl value furnishes probably the surest means of ascertaining the purity, its high figure distinguishing castor oil from all commonly occurring oils. On cooling the oil to  $0^{\circ}$  it becomes turbid with separation of crystalline flakes, and at about  $-18^{\circ}$  it congeals to a yellowish mass.

Castor oil is an unirritating purgative, its action being exerted as a result of saponification in the small intestine with formation of alkali ricinoleate. It should not be saponified before administration, as it may then irritate the stomach and set up nausea and vomiting. This oil is the most valuable laxative available in medicine; it is not followed by any tendency to constipation, and it is suitable for use in pregnancy, after parturition, in piles or anal fissure, and for children or delicate persons. It is often of service in acute diarrhoea, with the addition of 6 decimils (10 minims) of tincture of opium. Small repeated doses may be given in the intestinal colic of children. The oil is used as a rectal injection to remove impacted fæces (see *Enema Olei Ricini*), sometimes with olive oil, and is added to spirituous hair-lotions to prevent the drying effect of the alcohol. Castor oil is an excellent solvent of pure alkaloids, and such solutions of atropine, cocaine, physostigmine, etc., are used in ophthalmic surgery. It is also dropped into the eye to remove the after-irritation caused by the removal of foreign bodies. Castor oil is best given in milk or as *Mistura Olei Ricini*. Capsules are prepared containing 10 to 60 minims in each. The dose should be administered an hour before breakfast, on an empty stomach. Aromatic castor oil is an agreeable form for administration to children.

*Dose.*—4 to 30 mils (1 to 8 fluid drachms).

NOTE.—The so-called "castor oil powders" are usually preparations of magnesium ricinoleate.

## OLEUM RICINI AROMATICUM.

### AROMATIC CASTOR OIL.

Amyl Acetate	...	...	...	...	...	0.10
Gluside	...	...	...	...	...	<del>0.30</del> 0.15
Alcohol	...	...	...	...	...	5.00
Castor Oil, sufficient to produce	...	...	...	...	...	100.00

Dissolve the amyl acetate and the gluside in the alcohol, then add the castor oil.

This preparation is specially suitable for administration to children. It may be given mixed with milk, or from a spoon previously moistened with water.

*Dose.*—4 to 30 mils (1 to 8 fluid drachms).

## OLEUM ROSÆ.

## OIL OF ROSE.

*Synonym.*—Otto of Rose.

Otto of rose is obtained by distillation from the fresh flowers of the damask rose, *Rosa damascena*, Miller (N.O. Rosaceæ), a plant which is cultivated largely in European Turkey, Egypt, Persia, Cashmere, India, etc.

It occurs as a pale yellow, semi-solid, crystalline mass at ordinary temperatures, having the strong, fragrant odour of the damask rose, and a mild, slightly sweet taste. It yields turbid mixtures with even very large amounts of alcohol on account of the difficultly soluble paraffins; the liquid portion of the oil forms clear solutions with 70 per cent. alcohol. Specific gravity, 0.850 to 0.858 at 30°. Rotation, slightly lævo-rotatory, up to -4°. Saponification number, 10 to 17. Acid number, 0.5 to 3.0. Congealing point, 17° to 23°, usually about 20°. Stearopten content, 10 to 15 per cent.

The chief constituents of the oil are the alcohols geraniol,  $C_{10}H_{18}O$ , and citronellol,  $C_{10}H_{20}O$ , the former being present to the extent of 70 to 75 per cent. or more, while the citronellol constitutes only about one-fourth of the liquid portion of the oil. Traces of esters of these alcohols are also present, but as the characteristic odour of the oil is not due to any of these constituents, either singly or mixed, the presence of some other odorous principle is assumed. The differences in the odours of varieties of the oil appear to indicate chemical differences. Free acids, from decomposition of the esters, are also present. The solid stearopten is a mixture of two or more inodorous paraffin hydrocarbons. One of the chief adulterants of oil of rose is palmarosa oil, from *Andropogon Schænanthus*, Linn., which has the effect of lowering the melting-point, but this has been counteracted by the addition of spermaceti, stearin, paraffin wax, or the oil of *Rosa alba*, Linn., which contains more solid stearopten than that of *Rosa damascena*; other adulterants are true geranium oil, guaiacum wood oil obtained from *Bulnesia sarmienti*, Lorentz, sandal wood oil, and fixed oils, the last named being detected by the fact that they leave a greasy stain on paper when heated. Paraffin, which is sometimes added to oil deficient in stearopten, crystallises with a more granular structure than the normal constituent. Spermaceti and stearin as adulterants are detected by saponification, the resulting salts yielding palmitic and stearic acids respectively on decomposition with hydrochloric acid, no fatty acids being yielded on saponifying pure rose oil. Alcohol lowers the specific gravity; sandal wood oil increases it; palmarosa oil has little effect either on the density or rotation. Guaiacum wood oil increases the specific gravity and optical rotation, raises the congealing point, and on evaporation leaves a resinous residue. The great similarity of rose oil and many of its adulterants render detection by physical properties a matter of the greatest difficulty.

Colour tests are useless. The sense of smell is one of the most useful means of assessing the value of the oil.

Oil of rose is largely employed in perfumery. It is also used, because of its odour, in preparing lozenges, tooth powders, tooth pastes, liquid dentifrices, ointments, and articles for the toilet.

### OLEUM ROSMARINI.

OIL OF ROSEMARY.

*Synonym.*—Oleum Anthos.

Oil of rosemary is obtained by distillation from the flowering tops of rosemary, *Rosmarinus officinalis*, Linn. (N.O. Labiatae), an ever-green shrub, native of Southern Europe, growing abundantly on dry rocky hills in the Mediterranean regions. Most of the oil is imported from the south of France and the Dalmatian Islands, but that distilled in Britain is superior to the imported oil.

It occurs as a colourless, pale yellow, or slightly greenish-yellow liquid, having the characteristic pungent odour of rosemary and a warm, bitter, camphoraceous taste. Soluble in alcohol (2 in 1), and in all proportions of absolute alcohol. Specific gravity, 0.900 to 0.920 (0.894 to 0.912 at 25°). Rotation, ~~always~~ dextro-rotatory, +1° to +12°. Saponification number, 12 to 20.

The chief constituents of the oil are borneol, about 6 per cent.; bornyl acetate and other esters, 17 to 20 per cent. Other constituents are camphor, cineol, pinene, and camphene. The chief adulterants of oil of rosemary are oil of turpentine and petroleum, both of which are much less soluble in alcohol than is oil of rosemary. On fractionation the first 10 per cent. should be dextro-rotatory. All lævo-rotatory oils found in commerce may safely be declared as adulterated. Petroleum would be shown on evaporating the oil on a water-bath; the pure oil volatilises, leaving only a slight resinous residue, whereas the petroleum would remain. Fractions of camphor oil and alcohol have also been used to adulterate, but these affect the gravity, while the presence of alcohol may be detected by drying the oil over fused calcium chloride and adding a crystal of magenta, which will dissolve and colour the oil pink if alcohol be present, but is insoluble in pure oil of rosemary.

Oil of rosemary has the carminative properties of other volatile oils. It is employed principally as Spiritus Rosmarini in hair lotions for its odour and for its supposed effect in stimulating the growth of the hair.

*Dose.*— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

### OLEUM RUTÆ.

OIL OF RUE.

Oil of rue is obtained by distillation from the garden rue, *Ruta graveolens*, Linn. (N.O. Rutaceae), a plant which is cultivated in countries of temperate climate.



It occurs as a pale yellow liquid having a characteristic, sharp, unpleasant odour, becoming pleasant on considerable dilution. Soluble in 70 per cent. alcohol (1 in 2 or 3) forming a clear solution. Specific gravity, 0.830 to 0.840, the lowest of all the essential oils. Rotation,  $+0^{\circ} 13'$  to  $+2^{\circ} 10'$ . Solidifies to a crystalline mass at  $8^{\circ}$  to  $10^{\circ}$ .

The chief constituent of the oil, and the only one actually identified, is methyl nonyl ketone,  $C_{11}H_{22}O$ , of which the oil contains at least 90 per cent. Lauric aldehyde,  $C_{12}H_{24}O$ , is supposed to be present, but absolute proof is wanting. The value of the oil depends on the amount of methyl nonyl ketone contained in it, and the solidifying point affords some indication of the amount of ketone present. The ketone may be separated from the oil by shaking with solution of sodium acid sulphite, adding ether, and pressing the mixture. The solid cake is again treated with ether and pressed, and the operation repeated several times. The compressed cake is finally broken up and decomposed by an alkaline solution, the separated oil being purified by distilling in a current of steam. The specific gravity of the purified product is about 0.830. Boiling-point,  $225^{\circ}$ ; melting-point,  $+15^{\circ}$ . It is an oily liquid with a bluish fluorescence. Adulteration of the oil is easily detected, the additions usually lowering the solidifying point and raising the specific gravity. Turpentine, the usual adulterant, and petroleum may be detected by the insolubility of the oil in 70 per cent. alcohol. Not more than 5 per cent. of the oil distils over below  $200^{\circ}$ ; the remainder distils almost entirely between  $215^{\circ}$  and  $232^{\circ}$ .

Oil of rue has properties resembling those of other volatile oils; it is employed principally as an antispasmodic in hysterical conditions, and as an emmenagogue in amenorrhœa. The oil may be given on sugar, or in hot water.

*Dose.*—1 to 3 decimils (2 to 5 minims).

## OLEUM SABINÆ.

### OIL OF SAVIN.

Oil of savin is obtained by distillation from the fresh tops of savin, *Juniperus Sabina*, Linn. (N.O. Coniferæ), indigenous to the mountains of Southern Europe and frequently cultivated in Britain.

It occurs as a colourless or yellowish liquid having a peculiar, unpleasant, narcotic odour, and a bitter, pungent, camphoraceous taste. Soluble in half its volume or more of alcohol; in 80 per cent. alcohol (1 in 15 to 20), but not always forming a perfectly clear solution. Specific gravity, 0.910 to 0.930 (0.903 to 0.923 at  $25^{\circ}$ ). Rotation,  $+40^{\circ}$  to  $+60^{\circ}$ . Saponification number, 115 to 125. Not more than 25 per cent. should distil below  $200^{\circ}$ .

The chief constituent of the oil is sabinol,  $C_{10}H_{16}OH$ , an alcohol, occurring partly in the free state and partly combined with acetic acid as ester. The alcohol, of which the oil contains about 10 per

cent., is a colourless liquid with a faint odour like that of thujone, boiling at  $208^{\circ}$  to  $209^{\circ}$ . The ester, sabinyol acetate,  $C_{10}H_{15}OCOCH_3$ , present to the extent of about 40 per cent., has an odour like that of savin, and boils at  $222^{\circ}$  to  $224^{\circ}$ . Sabinol oxidised with potassium permanganate yields quantitatively tanacetogen dicarbonic acid ( $C_9H_{14}O_4$ ), melting at  $140^{\circ}$ . The sesquiterpene cadinene,  $C_{15}H_{24}$ , is present, and also a considerable proportion of terpenes, apparently consisting for the most part of pinene ( $C_{10}H_{16}$ ). French turpentine, one of the principal adulterants, lowers the specific gravity, reduces or inverts the angle of rotation, lowers the saponification number, and diminishes the solubility in alcohol.

Oil of savin is a powerful irritant, both externally and internally. It is employed in amenorrhœa with other emmenagogues, but in addition to pelvic congestion it may cause violent gastro-intestinal irritation, and its use, therefore, requires caution. It is usually given in pills, the oil being massed with liquorice powder and a little soap.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  decimils (1 to 4 minims).

### OLEUM SANTALI.

#### OIL OF SANDAL WOOD.

*Synonyms.*—Oil of Santal; Oil of Santal Wood.

Oil of sandal wood is obtained by distillation from the wood of *Santalum album*, Linn. (N.O. Santalaceæ), a small tree indigenous to the mountains of India, and cultivated in dry, open places in Southern India, chiefly in Mysore, Malabar, and Coimbatore.

It occurs as a pale yellow, sometimes almost colourless, somewhat viscid, oily liquid, having a peculiar, faint, but persistent aromatic odour, and an unpleasant nauseous taste. Soluble in less than its own weight of alcohol; should form a clear solution with five or six times its volume of 70 per cent. alcohol, not becoming turbid by further addition (absence of cedar wood oil and possibly other oils); the alcoholic solutions are acid to litmus. The solubility diminishes under the action of air and light. Specific gravity, 0.975 to 0.980 (0.965 to 0.975 at  $25^{\circ}$ ). Rotation,  $-16^{\circ}$  to  $-20^{\circ}$ . Saponification value, 5 to 15.

The chief constituent of the oil is santalol,  $C_{15}H_{26}O$ , a mixture of two sesquiterpene alcohols with different boiling-points. The bulk of the oil consists of this mixture of alcohols (94 to 98 per cent.); an aldehyde, santalal,  $C_{15}H_{24}O$ , yielding santalenic acid on oxidation (which crystallises in thin laminae, melting at  $76^{\circ}$ ), is also present, together with small quantities of esters and free acid. The adulterations are, other varieties of santal oil, cedar wood oil, castor oil, gurjun balsam oil, copaiba oil, and not infrequently sesame, paraffin, and linseed oils. The valuation of the oil is best determined by acetylation, which converts the alcoholic constituents into acetic esters, and saponification of the acetylated oil, when from 94

to 98 per cent. santalol, should be indicated, but not less than 90 per cent. Cedar wood oil gives an increase in the rotation, lowers the specific gravity, and diminishes the solubility; similar effects are produced by copaiba and gurjun balsam oils, the former, however, usually diminishing the rotation; West Indian oil is dextro-rotatory, and very difficultly soluble in alcohol; castor oil may be shown by its low specific gravity and high saponification number; cedar wood oil is further shown by fractional distillation. Under reduced pressure of 14 millimetres no distillate is obtained from pure oil below  $150^{\circ}$ , but with cedar wood oil 85 to 90 per cent. distils under these conditions between  $125^{\circ}$  and  $155^{\circ}$ . The high boiling-point is characteristic of santal oil.

Oil of sandal wood is given in the sub-acute stages of cystitis and gonorrhœa for its action as a disinfectant to the urinary passages during excretion; it is also used occasionally as an expectorant in chronic bronchitis. On account of its persistent taste the oil is usually administered in capsules, often in combination with other volatile oils or with formamine. Mixtures may be prepared by emulsifying the oil with an equal weight of powdered acacia in the usual manner, or the sandal wood oil may be suspended with one-fourth its weight of tragacanth or half its volume of tincture of quillaia. *Mistura Santali Composita* is a favourite method of administration with some practitioners, and various compound liquors of sandal wood with copaiba, cubebs, buchu, etc., are prepared.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

**NOTES.**—Oil of sandal wood should be protected from the air and light. The purified alcohol of sandal wood oil, santalol, has been prepared for use in gonorrhœa under the names Gonal and Gonoral. Santalol salicylate has been described under the name Santyl; it is free from the persistent taste of the oil, is said not to irritate the stomach or kidneys, and is resolved in the intestine into santalol and salicylic acid.

## OLEUM SASSAFRAS.

### OIL OF SASSAFRAS.

Oil of sassafras is obtained by distillation from the root and root bark of *Sassafras officinale*, T. Nees and Eberm. (N.O. Laurineæ), a native of North America.

It occurs as a yellow or reddish-yellow liquid, having the characteristic odour of safrol, and a warm aromatic taste. Soluble in all proportions of alcohol, the solution being neutral to litmus paper. Specific gravity, 1.065 to 1.095 ( $1.065$  to  $1.075$  at  $25^{\circ}$ ; rotation,  $+1^{\circ}$  to  $+4^{\circ}$ ).

The chief constituent of the oil is safrol,  $C_{10}H_{10}O_2$ , which is present to the extent of about 80 per cent., and is the body to which the oil owes its odour and chief properties. Most of the safrol may be separated from the oil by freezing. At ordinary temperatures it is a colourless liquid. Specific gravity, 1.100. Boiling-point,  $232^{\circ}$ . Optically inactive. At low temperature it is a white crystalline mass, melting at  $8^{\circ}$ . On



oxidation it yields heliotropin (or piperonal), and is much used for that purpose commercially. By the action of alcoholic solution of potassium hydroxide it is converted into isosafrol. Safrol is also found in camphor oil (50 per cent. and more), from which much of it is obtained. Other constituents of the oil are pinene and phellandrene, which together constitute about 10 per cent. of the oil; d-camphor,  $C_{10}H_{16}O$ , and a small percentage of eugenol,  $C_{10}H_{12}O_2$  (about 0.5 per cent.). A sesquiterpene, cadinene, is suspected to be present. Adulteration with camphor oil is frequent, and is exceedingly difficult to detect, since the camphor oil contains all the constituents found in sassafras oil. Its presence, however, is indicated by great variations in the physical properties. "Artificial sassafras oil" is said to contain fractions of camphor oil of a specific gravity approaching that of the genuine oil.

Oil of sassafras is used in perfumery, and is a pleasant flavouring agent for dentifrice powders. It may be employed as a rubefacient and anodyne liniment in chronic rheumatism in the same manner as oil of camphor.

*Dose*.—6 to 30 centimils (1 to 5 minims).

## OLEUM SESAMI.

### SESAME OIL.

*Synonyms*.—Gingelly Oil; Gingilli Oil; Teel Oil.

Sesame oil is obtained by expression from the seeds of *Sesamum indicum*, Linn. (N.O. Pedalineeæ), the sesame plant, largely grown in India, China, Japan, and most tropical countries. The yield of oil is from 50 to 57 per cent.

It occurs as a limpid, oily liquid of pale yellow colour, having a pleasant grain-like odour and a bland taste. Specific gravity, 0.921 to 0.924; congeals at about  $-5^{\circ}$ . Rotation slightly dextrogyrate, from about  $+1^{\circ}$  to  $+9^{\circ}$ .

The oil consists essentially of the glycerides of oleic and linoleic acids with small proportions of stearin, palmitin, and myristin. Sesamin,  $C_{18}H_{18}O_5$ , another constituent of the oil, may be obtained in long crystalline needles melting at  $118^{\circ}$ ; rotation  $+68^{\circ} 36'$ ; insoluble in water, light petroleum, ether, alkalies and mineral acids; easily soluble in chloroform, benzene, and glacial acetic acid. To this substance and to phytosterol is due the optical activity of the oil. Besides these bodies, sesamol, a phenol, is said to be present. The solid fatty acids are present to the extent of 12 to 14 per cent.; the liquid fatty acids, about 70 per cent. It further contains a very characteristic substance, which serves as an almost infallible means of identification of the oil or its admixture with other oils even in very small percentages by the following test:—Dissolve 1 decigram of sugar in 10 mls of hydrochloric acid of specific gravity 1.190, in a test-tube, and add 20 mls of the oil to be tested. Shake well and allow to stand. In the presence of even minute quantities of sesame oil the

separated aqueous liquid will have a crimson colour. In place of the sugar, 0·1 mil of a 2 per cent. alcoholic solution of furfural may be used. This is known as Baudouin's test. The chromogenetic substance passes completely into the liquid fatty acids when these are separated in the usual way, and is not destroyed by heating the oil to 200° to 250° for ten or twenty minutes. The following is also a characteristic test. If 10 mils be treated with 10 mils of hydrochloric acid containing 6 decigrams of pyrogallol, and the mixture be shaken vigorously and then set aside for one minute, two layers will be formed. The upper oily layer is to be carefully removed by means of a pipette; the lower acid layer is to be boiled for five minutes, when it will gradually assume a colour which is purple by transmitted light and blue by reflected light.

The common adulterants of sesame oil are poppy seed oil, arachis oil, cotton seed oil, and rape oil. Saponification value, 189 to 193; iodine value, 103 to 108. The best qualities of the oil are largely used in the manufacture of margarine.

Sesame oil is used in the preparation of additive compounds of iodine and bromine, iodinol (Iodipin) and brominol (Bromipin), which are employed for external, internal, or subcutaneous use.

NOTE.—Sesame oil may be employed as a substitute for olive oil in making the official liniments, ointments, and plasters, in India, and the African, Eastern, and North American Colonies.

## OLEUM SINAPIS EXPRESSUM.

### EXPRESSED OIL OF MUSTARD.

Expressed oil of mustard is obtained by pressure from the seeds of *Brassica nigra*, Koch, and *Brassica alba*, Boiss. (N.O. Cruciferae), cultivated in most civilised countries. The yield of oil is from 31 to 33 per cent., and 25 to 26 per cent., respectively.

The oil from black mustard seed is obtained as a by-product in the manufacture of the volatile oil, and occurs as a brownish-yellow liquid, having a mild taste. Its chemical composition closely resembles that of rape oil. Specific gravity, 0·916 to 0·920. It contains from 2·3 to 4 per cent. of solid fatty acids, including arachic acid, unsaturated erucic acid, and a liquid fatty acid. Free fatty acids—about 1 per cent.—have also been found. Solidifying point,  $-17^{\circ}$ ; saponification value, 173 to 175; iodine value, 96 to 110.

The oil from white mustard seed occurs as a golden-yellow coloured liquid, having a burning taste. The physical and chemical constants of the oil appear to be very similar to those of the black seed oil, the iodine value being the chief point of difference. Specific gravity, 0·914 to 0·916; solidifying point,  $-8^{\circ}$  to  $-16^{\circ}$ ; saponification value, 170 to 174; iodine value, 92 to 97.

Expressed oil of mustard has mild rubefacient properties, and is employed as an application to the chest in place of camphorated oil, and to rub rheumatic joints. The oil obtained from white mustard

seed is used for lubricating, and also for burning; that from black mustard seed is used for making soap, and is not suitable for burning.

### OLEUM SINAPIS VOLATILE.

#### VOLATILE OIL OF MUSTARD.

Volatile oil of mustard is obtained by distillation from the dried ripe seeds of black mustard, *Brassica nigra*, Koch (N.O. Cruciferae), after they have been deprived of fixed oil and fermented by maceration with tepid water (below 70°) for several hours, when a reaction takes place between the glucoside sinigrin (potassium myronate) and the ferment myrosin, with the production of mustard oil.

It occurs as a colourless or pale yellow, strongly refractive, mobile liquid, having an intensely pungent odour and an acrid taste. Great caution should be taken in smelling the oil, and it should only be tasted when very highly diluted. In contact with the skin it causes almost immediate blistering. Soluble in water (1 in 50), in 70 per cent. alcohol (1 in 10), in all proportions of alcohol, ether, amylic alcohol, benzene, petroleum ether. Specific gravity, 1.018 to 1.030 (1.013 to 1.020 at 25°). Optically inactive. Boiling-point, 147° to 152°. Exposed to light, it gradually becomes reddish-brown, and at the same time deposits a film on the inside of the bottle.

The oil consists almost entirely (95 to 99 per cent.) of allyl isothiocyanate,  $C_3H_5NCS$ , to which the high specific gravity of the oil is due. It also contains small and variable amounts of allyl cyanide, carbon bisulphide, and probably traces of isomeric allyl thiocyanate. The specific gravity serves to indicate absence of chloroform, carbon bisulphide, fatty oils, alcohol, and petroleum. Phenols may be detected by diluting the oil with 5 parts of alcohol and adding solution of ferric chloride, when genuine oil gives no colouration; a bluish-green colour would indicate phenols. On distilling the oil the first and last fractions should have the same specific gravity as the original oil (absence of alcohol, petroleum, chloroform, fatty oils, or more than traces of carbon bisulphide). Allyl isothiocyanate forms a solid, non-volatile compound with ammonia. On adding excess of ammonia and alcohol to mustard oil the odour of both disappears gradually in the cold, but more quickly on heating, whilst crystals of thiosinamine are formed. Thiosinamine or allyl thiourea crystallises in rhombic prisms, melting at 74°. It has a faint leek-like odour and taste, and is readily soluble in water, alcohol, and ether.

Volatile oil of mustard is an extremely powerful irritant; applied to the skin, it causes very rapid vesication. The extremely painful nature of blisters caused by mustard is explained by the volatility, and consequent great penetrating power, of the oil. Diluted with fifty times its volume of alcohol or eau de Cologne, or as Lini-mentum Sinapis, the oil is employed as a counter-irritant in cases where blisters cannot readily be applied, especially to paint behind the ear in catarrh of the middle ear.



NOTE.—Artificial mustard oil is obtained by the interaction of allyl iodide and potassium thiocyanate in alcoholic solution; allyl thiocyanate is first formed, and under the influence of heat is converted into the isothiocyanate.

## OLEUM SUCCINI.

### OIL OF AMBER.

*Synonym.*—Oleum Succini Rectificatum.

Oil of amber is obtained from amber by destructive distillation and purified by redistillation.

It occurs as a transparent, pale yellow, or brownish-yellow liquid, having a penetrating, disagreeable odour, and a burning, acrid taste. Soluble in alcohol (1 in 4 or 5), ether, chloroform, carbon bisulphide, and fixed oils. Specific gravity, 0.926 to 0.930; optical rotation,  $+22^{\circ} 30'$  to  $+26^{\circ}$ .

The oil is sometimes adulterated with oil of turpentine, and is not often seen in the pure state, the commercial article being frequently obtained by the destructive distillation of resins, such as copal and dammar. The specific gravity of the commercial oil is lower than that of the genuine, and so is the optical rotation.

Oil of amber has properties resembling those of oil of turpentine, and is sometimes given internally in the treatment of asthma and whooping-cough. Mixed with an equal quantity of olive oil, or as Linimentum Succini Compositum, it is used to rub the chest in bronchitis and whooping-cough.

*Dose.*— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

## OLEUM TEREBINTHINÆ.

### OIL OF TURPENTINE.

*Synonyms.*—Turpentine; Spirit of Turpentine.

Oil of turpentine is obtained by steam distillation from turpentine, an oleoresin obtained from *Pinus sylvestris*, Linn. (N.O. Coniferæ), and other species of *Pinus* growing in America, France, Russia, and elsewhere. The varieties of turpentine oil usually found in commerce are the American and French. Most of the oil, however, is imported from the United States.

It occurs as a colourless, limpid liquid, having a strong peculiar odour, and a pungent, somewhat bitter taste, both becoming stronger and less pleasant by age and exposure to air. The odour of the French oil is finer and milder than that of the American, which is decidedly terebinthinate. The sharp odour is said to be due to an aldehyde formed by exposure of the oil to the air. Soluble in alcohol (1 in  $6\frac{1}{2}$ ); in all proportions of absolute alcohol, chloroform, ether, carbon bisulphide, and glacial acetic acid (99.5 per cent.). Unlike most oils the solubility increases with age, owing to formation of more easily soluble oxidation products. The solubility as a test, therefore, is of no great value. It dissolves resins, fixed oils, beeswax, iodine, sulphur, phosphorus. Specific gravity, 0.855 to 0.880 (0.860 to 0.870 at  $25^{\circ}$ ). Rotation of the American variety, which is almost

invariably dextro-rotatory,  $+10^{\circ}$  to  $+15^{\circ}$ ; occasionally, however, it may be slightly lævo-rotatory, since the oil contains both dextro- and lævo-rotatory terpenes, the latter sometimes being in excess. The French oil is always strongly lævo-rotatory,  $-18^{\circ}$  to  $-40^{\circ}$ . The reaction of the oil is generally slightly acid. It is volatile at ordinary temperatures, and boils at about  $155^{\circ}$ , at least 88 per cent. distilling below  $165^{\circ}$ . On exposure to the air it undergoes rapid change, especially in the presence of moisture. It then becomes viscid and yellow, the specific gravity increases, the boiling-point rises, solubility in alcohol increases, and the oil originally neutral becomes acid and resinifies. These changes are all referable to slow oxidation.

The chief constituents of the oil are hydrocarbons, especially the two isomeric bodies d- and l-pinene. Other constituents are resin acids, camphene, and fenchene, whilst dipentene—the optically inactive form of limonene—and polymeric terpenes may occur as the result of the action of the acids present on pinene. Traces also of oxidation products, such as formic, acetic, and camphoric acids as well as camphoric aldehyde,  $C_{10}H_{16}O_3$ , are present, the last named giving the peculiar odour to rancid turpentine oil. The American oil consists chiefly of d-pinene, the French oil of l-pinene. In all other respects the composition of the two varieties is similar. There is no ozone present. The action of direct sunlight in presence of moisture and air or oxygen causes the formation of pinol hydrate,  $C_{10}H_{18}O_2$ , while continuous action of air in the presence of water develops a large quantity of oxygenated products, including hydrogen peroxide and camphoric acid, this reaction forming the basis of the "Sanitas" series of disinfectants. The usual adulterants are petroleum (illuminating), and resin oils. The former may be recognised by its lowering the specific gravity, and also by the flashing-point, which for pure turpentine oil lies at  $33^{\circ}$  to  $34^{\circ}$ . The resin oil, a product of the destructive distillation of resin, may be detected by the fatty stain which the adulterated oil leaves when evaporated from paper. Other adulterants, such as the volatile portions of shale oil and coal tar, have been used. It should leave only a very slight residue when evaporated on the water-bath. On being treated with sulphuric acid it yields terebene—a mixture of dipentene, terpinene, and other optically inactive terpenes. On clean white filtering paper exposed to the air it should evaporate entirely, leaving no permanent stain. If 5 mils of the oil be placed in a small beaker, and 20 mils of sulphuric acid be gradually added, with agitation, while the beaker is cooled by immersion in cold water, and the contents, after cooling and renewed agitation, be transferred to a burette graduated to tenths of mils, the clear layer which forms after the dark mass has settled should not measure more than 0.35 mil (absence of petroleum benzin, kerosene, or similar hydrocarbons). Oil of turpentine is rectified for medicinal purposes, and is also purified by means of lime water or solution of potassium hydroxide, any free acid being thus neutralised and removed; further, the resinified portion of the oil may be removed

by shaking with alcohol and water alternately. Oxidation products with an acid reaction re-form, however, on further exposure.

The action of oil of turpentine is representative of that of a large number of volatile oils. They are antiseptics, used internally or externally, and in sufficient concentration are rapidly germicidal to all forms of bacteria. Applied to the skin they produce irritation and rubefaction, the redness being due to dilatation of the superficial vessels. Inhaled, they arrest profuse secretion, and relieve congestion of the bronchioles, but the degree of concentration obtainable in this manner is insufficient for their antiseptic action to be exerted to any great extent. Taken internally, the volatile oils excite a reflex flow of saliva, and cause a sensation of warmth in the mouth and stomach. They stimulate the stomach, relieve colic, and assist in the expulsion of flatus. They are absorbed unchanged into the blood and produce leucocytosis, excretion taking place through the lungs, skin, and kidneys. During excretion by the bronchioles they act as expectorants, assisting in the expulsion of mucus; excretion by the skin causes some diaphoresis, and may give rise to mild skin eruptions, this being especially common with copaiba. The most important action of many volatile oils is exerted upon the genito-urinary tract after excretion by the kidneys. They produce dilatation of renal vessels and consequent diuresis, and appear in the urine in combination with glycuronic acid. They lessen inflammatory exudation and retard the putrefaction of the urine. Large doses set up inflammation of the bladder and urethra, and small doses may exaggerate pre-existing inflammatory conditions; the oils are therefore given only in the sub-acute stages of disease.

Oil of turpentine is employed externally as a counter-irritant and rubefacient, in the form of *Linimentum Terebinthinæ* and *Linimentum Terebinthinæ Aceticum*, in chronic rheumatism and various chest affections. To relieve deep-seated pain and inflammation, as in peritonitis, flannels are wrung out of hot water, sprinkled with oil of turpentine and applied to the seat of pain. The oil is used as an inhalation in chronic bronchitis, but terebene is usually preferred. Internally, the oil is given in small doses in bronchitis and phthisis, and to arrest hæmorrhage from the lungs, nose, uterus, kidneys, or intestine, but its use for the latter purpose is based on misconception. Large doses are purgative and anthelmintic; to prevent absorption they are best given with castor oil. Oil of turpentine expels tape worms and thread worms; for the latter it may be used as *Enema Terebinthinæ*, with or without castor oil. The oil may be given internally in mixture form, emulsified with half its weight of powdered acacia, or one-fourth its weight of powdered tragacanth, by the processes described in the monographs on those gums; it is also given enclosed in gelatin capsules. Oil of turpentine has been given as an antidote in cases of poisoning by phosphorus; but, though it combines with the phosphorus to form compounds of a less toxic nature than that substance, the results have not been entirely satisfactory. In



cases of poisoning by large doses of turpentine, emetics and demulcent drinks should be given, with Epsom salts to promote purgation and opium to relieve pain.

*Dose*.—1 to 6 decimils (2 to 10 minims); as an anthelmintic, 12 to 15 mils (3 to 4 fluid drachms).

NOTE.—*Oleum Terebinthinæ Rectificatum*, U.S.P., is prepared by shaking oil of turpentine with an equal volume of solution of sodium hydroxide, then recovering about three-fourths of the oil by distillation, separating the clear oil from the water, and filtering. Specific gravity, 0·860 to 0·865 at 25°, Average dose, 1 mil (15 minims).

## OLEUM THEOBROMATIS.

OIL OF THEOBROMA.

*Synonym*.—Cacao Butter.

Oil of theobroma is a solid fat obtained by expression from the crushed seeds of *Theobroma Cacao*, Linn. (N.O. Sterculiaceæ), a native of Mexico, South America, and the West Indies. It is obtained chiefly as a by-product in the manufacture of chocolate and cocoa.

It occurs as a concrete fat or fixed oil, usually in oblong cakes which break with a smooth fracture, showing indications of crystalline structure, yellowish-white or pale yellow when fresh, but becoming white on keeping; the odour resembles that of chocolate and the taste is bland and agreeable. It becomes rancid on keeping, but the tendency to do so is not so great as in the case of most other fats. Readily soluble in ether, chloroform, benzene, petroleum ether; in boiling absolute alcohol (1 in 5); insoluble in alcohol (distinction from coco-nut oil). Specific gravity, 0·990 to 0·998 (0·970 to 0·976 at 25°). It is somewhat brittle at ordinary temperatures, softens at 26·6°, and melts between 31° and 34°. Saponification value, 188 to 195. Iodine value, 33 to 38. When the oil has been recently melted, the specific gravity on solidification is lower than that stated, owing apparently to some molecular change caused by the application of heat; these effects do not pass away entirely at once, and the specific gravity only attains its higher and final value after some time has elapsed.

The chief constituents of the fat are the glycerides of stearic (about 40 per cent.), palmitic, and oleic acids, together with small quantities of the glycerides of arachidic, linoleic and other fatty acids. The adulterants are paraffin, stearin, wax, coco-nut oil, tallow, suet, or other fats. Coco-nut oil, which is largely used as an adulterant, contains much larger proportions of fatty acids, increases the saponification value considerably, and reduces the iodine value. The following test will show the absence of other fats:—On dissolving 1 mil in 3 mils of ether and exposing the solution to a temperature of 0°, the liquid will not become turbid, nor deposit a granular mass in less than three minutes, whilst after congealing a clear solution should result on warming the mass to 15·5°. For this test a strong test-tube, corked, should be used.

The manner in which the crystallisation of the fat from ether occurs should be noted. Cacao butter separates in tufts at the bottom and sides of the tube, whilst in the presence of 5 per cent. of tallow the crystals separate in flakes.

Oil of theobroma is employed in pharmacy chiefly for the preparation of suppositories, pessaries, and bougies. Samples of a low melting-point are preferable for this purpose, as various medicaments—especially metallic salts and substances containing tannin—raise the melting-point of the mass. Oil of theobroma is sometimes an ingredient of emollient ointments, and it is rubbed on the skin as a lubricant in massage. It is customary to prepare suppositories, pessaries, and bougies with an oil of theobroma basis, in the absence of any indication to the contrary.

### OLEUM THYMI.

#### OIL OF THYME.

Oil of thyme is obtained by distillation from the leaves and flowering tops of *Thymus vulgaris*, Linn. (N.O. Labiatae), indigenous to the countries bordering on the Mediterranean and now cultivated in most countries with a temperate climate. The oil frequently goes under the name of origanum oil, but erroneously so, as origanum oil is in reality a product of a species of origanum.

It occurs as a dark reddish-brown or colourless liquid having a pleasant, strong, thyme odour, and a biting, persistent taste, which is afterwards cooling. Soluble in alcohol (2 in 1); in 80 per cent. alcohol (1 in 1 to 2); in 70 per cent. alcohol, 15 to 30 parts being mostly required to form a clear solution. Specific gravity, 0.905 to 0.935 (0.900 to 0.930 at 25°). Slightly lævo-rotatory. The red-coloured oil on being properly rectified yields the "white" oil. White thyme oil, however, is not infrequently ordinary dark coloured oil, with a large addition of turpentine oil.

The chief constituents of the oil are from 25 to 42 per cent. of the phenols, thymol,  $C_{10}H_{14}O$ , and its isomer carvacrol. Other constituents are cymene,  $C_{10}H_{14}$ ; l-pinene,  $C_{10}H_{16}$ , in very small quantity; borneol,  $C_{10}H_{18}O$ , linalool,  $C_{10}H_{18}O$ , and bornyl acetate,  $C_{12}H_{20}O_2$ . The most common adulterant is turpentine oil, which reduces the specific gravity, diminishes the solubility in alcohol, and reduces the phenol content. French turpentine oil gives a high lævo-rotation. The percentage of phenols present is approximately shown by shaking the oil with a 15 per cent. solution of potassium hydroxide and calculating the absorbed portion as thymol. With a drop of ferric chloride solution it yields a greenish-brown colouration, which changes to reddish.

Oil of thyme is employed in combination with olive and other oils as a rubefacient and counter-irritant in rheumatism, etc. Internally it is antiseptic, antispasmodic, and carminative.

*Dose.*—6 to 30 centimils (1 to 5 minims).

**OLIBANUM.**

OLIBANUM.

*Synonym.*—Frankincense.

Olibanum is a gum-resin obtained from *Boswellia Carterii*, Birdwood (N.O. Burseraceæ), and other species of *Boswellia*, small trees indigenous to Somaliland and Southern Arabia. The trees contain schizogenous ducts in the bark, in which an oleo-resinous emulsion is secreted. The secretion exudes on incision, and when it has sufficiently dried is collected and exported from Aden *via* Bombay.

It occurs in small tears, varying from 5 to 25 millimetres in length. They are usually ovoid in shape, and of a pale yellowish, bluish, or greenish colour. The surface is dusty, and dull after the removal of the dust. Internally they are dull, waxy, and semi-translucent. The odour is agreeable, the taste fragrant and slightly bitter, the tears easily breaking up between the teeth, and softening to a plastic mass.

The gum-resin contains 60 to 70 per cent. of resin, 27 to 35 per cent. of gum, and 3 to 8 per cent. of volatile oil. The resin consists chiefly of a resin acid (boswellic acid) and a resene (olibanoresene) in about equal proportions; the gum consists chiefly of arabin, with which a little bassorin is associated. The volatile oil (specific gravity, 0.875 to 0.885; optical rotation,  $-11^{\circ}$  to  $-17^{\circ}$ ) is colourless, or yellowish and fragrant; it consists of 1-pinene, dipentene, and phellandrene. The oxygenated constituents which distil above  $175^{\circ}$  and probably contain the aromatic bodies have not yet been investigated.

Olibanum is used in the preparation of plasters, and is an ingredient of incense and fumigating powders.

**OLIVERI CORTEX.**

OLIVER BARK.

*Synonym.*—Black Sassafras.

Oliver bark is obtained from *Cinnamomum Oliveri*, Bailey (N.O. Laurineæ), a tree indigenous to New South Wales and Queensland.

It occurs in flat strips, usually about 20 centimetres long, 4 wide, and 1 thick. Outer surface brownish in colour with patches of whitish cork, very coarsely granular or warty, inner surface umber-brown, finely striated, and satiny. Fracture short and somewhat fibrous. The section exhibits a somewhat thick periderm, often separated by a paler line of cork tissue from the inner part of the secondary bast, in which numerous bast fibres can be discerned. Odour agreeable, recalling sassafras; taste aromatic, slightly bitter, and pungent.

The chief constituent of the bark is about 1 per cent. of a yellow volatile oil, which contains safrol, eugenol, cineol, and cinnamic aldehyde. The bark also contains tannin.

Oliver bark is official in the Australian Colonies, where it is used as a substitute for cinnamon. A tincture of the bark is prepared.



## OPIUM.

## OPIUM.

Opium is the inspissated juice obtained from the capsules of the opium poppy, *Papaver somniferum*, Linn. (N.O. Papaveraceæ). The plant from which opium is obtained is chiefly *P. somniferum*, var. *album*, DC., which is indigenous to Asia Minor, and cultivated largely in European and Asiatic Turkey, Persia, India, and China, for the production of opium. All parts of the plant, but particularly the walls of the capsules, contain a branching and anastomosing system of laticiferous vessels, filled with a white latex. After the petals have fallen from the flowers, transverse, oblique, or vertical incisions are made in the wall of the unripe capsules, care being taken not to penetrate to the interior. The exuded juice, partially dried, is collected by scraping, the scrapings forming eventually cakes, which are wrapped in poppy leaves or paper, and further dried in the sun. The white, milky juice darkens during the drying.

Turkey opium, which for pharmacists' use is the most important variety, occurs in rounded (Smyrna) or flattened (Constantinople) masses enveloped in poppy leaves, and covered with the reddish-brown triangular winged fruits of a species of *Rumex* to prevent the cakes from adhering to one another. These cakes vary in weight from 250 to 1000 grammes or more. Internally, fresh Turkey opium is granular and of a rich light brown or reddish-brown colour. It has a strong, characteristic odour and bitter taste. Persian opium, the only other variety of opium regularly imported into this country, is kneaded into a homogeneous mass, which is then divided into bluntly conical cakes weighing about 200 to 400 grammes, or brick-shaped masses of varying weight; these are usually wrapped in red paper, and tied round with string. Persian opium is sometimes, but not often, seen in sticks or flat cakes, wrapped in white paper. It may be distinguished from Turkey opium, apart from the different packing, by its perfectly homogeneous (not granular) nature. It is often oily, the oil being apparently added after the collection of the juice. Much of it is exported to South America and elsewhere for smoking.

Indian opium is prepared by partially drying the juice, beating the resulting adhesive and granular paste into a homogeneous mass, and forming it into cakes, which are then wrapped in paper. The product is not suitable for medicinal purposes. The use of any suitable variety of opium is officially permitted for preparing the tincture and the extract, provided that the dry drug contains not less than 7·5 per cent. of morphine, but opium that is used for other officially recognised purposes must contain between 9·5 and 10·5 per cent. of morphine calculated upon the opium dried at 100°. Opium yielding more than 10 per cent. of morphine may be diluted to this strength with an opium containing between 7·5 and 10 per cent. or with milk sugar. The permission thus given to use

an Indian (or other) opium for the purposes of dilution has not resulted in the importation of increased quantities of this variety. On the other hand, the demand now generally made by European pharmacopœias for an opium containing 10 per cent. of morphine is supplied by inferior grades of Turkey opium and by opium adjusted to contain this proportion of morphine.

Indian opium is usually nearly black, homogeneous, and of less agreeable aroma than Turkey opium. It occurs in rounded balls, weighing about 8 ounces (Malwa opium), or in square blocks weighing nearly 2 pounds, and wrapped in oiled paper (Patna, or Benares opium). Opium intended for exportation to China is made into balls about the size of a small Dutch cheese, which are enveloped in a casing made from poppy petals. But little Indian opium, however, reaches the English market.

The chief constituent of opium is the alkaloid morphine, which occurs in proportion varying from 4 to 18 per cent. of the dry opium, but seldom exceeds the latter figure. It exists in combination with acids (meconic and sulphuric) in the form of salts readily soluble in water. Unsophisticated Turkey opium of good quality contains from 12 to 16 per cent. of morphine calculated upon the dried drug. Lower qualities yield from 8 to 12 per cent. Persian opium of good quality contains about 10 to 12 per cent., occasionally as much as 16 per cent. of morphine. Indian opium contains less, viz., 4 to 8·5 per cent. Narcotine, which exists partly in the free state, partly as a salt, ranges from 1·5 to 12·5 per cent., but usually from 2 to 8 per cent. Codeine exists to the extent of 0·3 to 1·9 per cent. in combination with acids. The remaining alkaloids constitute about 1 per cent. of the drug. They include thebaine, narceine, papaverine, meconidine, codamine, laudanine, laudanosine, lanthopine, protopine, cryptopine, rhœadine, oxynarcotine, pseudomorphine, gnoscopine, xanthaline, tritopine, hydrocotarnine, and possibly others. They exist partly in the free state, partly combined with meconic and sulphuric acid. Meconin, meconoidin, and opionin are indifferent substances, existing in small proportions only. Other constituents of opium are mucilage, sugar, wax, and caoutchouc, together with salts of calcium, magnesium, and potassium, but starch, tannin, calcium oxalate, and fat, do not normally occur in opium, and their presence therefore indicates sophistication. Opium is not infrequently sophisticated, leaden shot, starch, sugary fruits, portions of the capsules and other vegetable substances or debris having been found in it. The moisture present in the drug varies from 7 to 24 per cent.; good opium should contain about 12·5 per cent. Exhausted with water it should give an infusion which is acid in reaction; it should leave about 36 per cent. of insoluble residue and yield from 45 to 55 per cent. of dry aqueous extract; the latter should contain all the morphine present in the drug (constituting about 25 per cent. of the extract). The insoluble residue, examined under the microscope, should not contain more than insignificant quantities of starch and of the outer epidermis of

the poppy capsule, portions of which are removed by the scraping and are more frequent in Turkish than in Indian opium. Persian opium often contains notable proportions of starch.

The action of opium is virtually that of morphine (see under *Morphina*); the other alkaloids are present in so small a proportion that they do not appreciably modify its effects. The important alkaloids of opium have in all cases a narcotic action, the action decreasing according to the order of the alkaloids in the following series:—morphine, papaverine, codeine, narcotine, thebaine. On the other hand, increase of reflexes is a gradually increasing feature of the later members of the group, until in thebaine practically no depression is detected, and the symptoms resemble those of strychnine. The action of opium is exerted less rapidly than that of morphine, as absorption appears to take place less readily. Upon the intestine the action is, therefore, more prolonged and more marked than that of morphine, and on this account preparations of opium are preferred in the treatment of diarrhoea and intestinal disorders. Opium is employed externally as *Emplastrum Opii* and *Linimentum Opii*, or the tincture is added to lotions, often with solution of subacetate of lead. The opium alkaloids have, however, no action on motor or sensory nerve-endings, and any good effect from their external application is due to absorption, or to warmth and counter-irritation. The solid and liquid extracts and tincture of opium are the usual forms for internal use as hypnotics and to allay pain. As a diaphoretic, it is given in the form of Dover's Powder in the early stages of colds, the dose being taken in a cachet or powder. For the intestinal action of opium, *Pilula Plumbi cum Opio*, *Pulvis Cretæ Aromaticus cum Opio* and *Pulvis Kino Compositus* are employed. *Pilula Saponis Composita* is a mild sedative; *Pilula Ipecacuanhæ cum Scilla* and *Tinctura Opii Ammoniata* are expectorants for use in coughs and colds. Lead and opium suppositories are used to relieve rectal and pelvic pain, and gall and opium ointment is a favourite application to inflamed piles. Children are very susceptible to the action of opium. To those under the age of five years it should only be given with great caution and in very small doses. Opium is incompatible with alkaline carbonates, salts of lead (though frequently prescribed therewith), copper, iron, mercury, and zinc, and with vegetable astringents. In cases of poisoning by opium, the antidotes are those described under *Morphina*.

*Dose*.—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

*NOTES*.—Opium, U.S.P., must yield, in its normal, moist condition, not less than 9 per cent. of crystallised morphine. *Opii Pulvis*, U.S.P., contains from 12 to 12.5 per cent. of morphine. Opium *Deodoratum*, U.S.P., is prepared by repeated maceration, and subsequent percolation, of powdered opium with purified petroleum benzin, the opium being subsequently dried by exposure to the air. Opium *Granulatum*, U.S.P., consists of opium dried at a temperature not exceeding 85°, and reduced to No. 20 powder. The average dose of opium, U.S.P., is 10 centigrams ( $1\frac{1}{2}$  grains), and that of powdered opium, deodorised opium, and granulated opium, 65 milligrams (1 grain).



**OS SEPIÆ.****CUTTLE FISH BONE.**

*Synonym.*—Cuttle Fish Shell.

Cuttle fish bone, so-called, is the internal shell of the cuttle, *Sepia officinalis* (Class Cephalopoda), a large mollusc, common round the coasts of Great Britain, abundant in the Mediterranean and Adriatic seas. The animal consists of a head and body, the latter being ovoid and flattened with a lateral extension on each side; around the mouth are ten long tentacles, and in the centre two large, powerful, horny beaks. The body consists of a muscular mantle, in the dorsal portion of which the shell is contained. This shell may be removed by slitting up the mantle. Amongst the organs of the body the ink gland may be noticed which conveys the secretion through a duct opening close to the anus. The ink, or sepia, is ejected with water when the mantle is contracted, and serves to conceal the animal. The shell is found on the shores of the Mediterranean and Adriatic, but may also be obtained when the ink secretion is collected. It consists of a long, ovate mass of chitin with a calcareous portion on its inner surface thickened posteriorly.

It occurs in commerce in white, oval-oblong, flattened masses, from 10 to 25 centimetres long and from 4 to 7·5 centimetres broad. The masses consist of a hard, outer, concave chitinous coat, upon the inner surface of which friable, calcareous layers have been deposited. It has a slight odour and a saline, somewhat earthy, taste.

The chief constituent of cuttle fish bone is 80 to 85 per cent. of calcium carbonate, together with a little sodium chloride, traces of calcium phosphate, and about 10 to 15 per cent. of organic matter.

Cuttle fish bone is employed principally as a constituent of tooth powders.

*NOTE.*—From the ink gland the pigment sepia is obtained by drying the secretion, dissolving it in caustic alkali, and reprecipitating it by an acid.

**OVI ALBUMEN.****EGG ALBUMEN.**

*Synonyms.*—Albumen; White of Egg.

Egg albumen is the liquid white of the egg of *Gallus Bankiva*, var. *domesticus* (Order Gallinæ).

It occurs as a glairy, viscid, usually colourless but occasionally pale yellow liquid; almost tasteless, or having only a faint saline taste; soluble in water, but insoluble in alcohol or ether. It consists of a semi-fluid material which is pervaded by a network of firmer and more fibrous material closely resembling the membrane enclosing the vitreous humour of the eye. On heating the aqueous solution to 75° it becomes coagulated. It is precipitated by most mineral and some organic acids, but not by phosphoric or acetic acid.

Alcohol coagulates it, and ether precipitates it, the precipitate being only partially soluble in water. It is soluble in caustic alkalies, but forms precipitates with the salts of most of the heavy metals, *e.g.*, mercury, copper, etc. It is precipitated also by volatile oils, camphor, carbolic acid, and tannic acid. Its aqueous solution is lævo-rotatory. When allowed to putrefy it gives rise not only to amido acids but also to other aromatic and fatty acids (*e.g.*, butyric acid), indol, skatole, and cresol, and also to the alkaloid-like ptomaines. Albumen should be free from any unpleasant odour.

The semi-fluid portion of albumen is alkaline, and contains 82 to 88 per cent of water, about 12 per cent. of proteids (globulins and albumins), 0.5 per cent. of sugar, traces of fats, alkaline soaps, lecithin and cholesterin, and less than 1 per cent. of inorganic residue. The total average weight for one egg is from 23 to 24 grammes (355 to 371 grains). On complete incineration it yields on an average about 0.65 per cent. of ash, which consists of 42 per cent. of potassium chloride, 9 per cent. of sodium chloride, phosphates, and sulphates of the alkalies, together with some silica, lime, iron, and magnesium. The organic portion has the elementary composition, carbon 53.7 per cent., nitrogen 15.5 per cent., hydrogen 7.1 per cent., oxygen 22.1 per cent., sulphur 1.6 per cent. The manner in which sulphur is contained in the molecule is unknown; its presence may be shown, however, by boiling the albumen with an alkaline solution of lead oxide, when lead sulphide is formed. By the action of the gastric juice, or pepsin in very dilute hydrochloric acid, albumen is converted into acid-albumen or syntonin, and finally into peptone.

NOTES.—Albumen Siccum, or dried albumen, may be obtained by careful evaporation on glass plates at a temperature not above 50°. It occurs in yellowish, transparent flakes or scales of a horny consistence. It is nearly soluble in about 10 parts of water, forming a neutral solution, which should respond generally to the description and tests given above. It should be free from unpleasant odour or taste. Solution of albumen is prepared by mixing albumen by trituration with four times its volume of distilled water, and filtering through clean tow, previously moistened with distilled water; it should be recently prepared.

## OVI VITELLUS.

### YOLK OF EGG.

Yolk of egg is obtained from the egg of *Gallus Bankiva* var. *domesticus* (Order, Gallinæ).

The yolk of the egg is a membranous sac, enclosing a yellow, or reddish-yellow, opaque, odourless liquid, with a bland taste and alkaline reaction. The liquid is a natural emulsion of a yellow oil, which is suspended in water by the aid of albuminous matter. It contains about 16 per cent. of vitellin and other proteids, 11 per cent. of lecithin, and 23 per cent. of fats.

Yolk of egg is employed as an emulsifying agent for oils, being particularly useful in the case of oil of turpentine and other limpid volatile oils. For this purpose it should be triturated lightly in

a mortar, the oil being added by degrees, with a little water if necessary. One yolk will, as a rule, emulsify one fluid ounce of fixed oil.

### OXYMEL.

#### OXYMEL.

Clarified Honey, liquefied, by weight ...	...	80·00
Acetic Acid ...	...	10·00
Distilled Water, sufficient to produce ...	...	100·00

Add the honey to the acid and add about 10 of distilled water, or sufficient to produce a preparation of specific gravity 1·320.

Oxymel is employed in gargles and cough mixtures, and is a domestic remedy for colds and sore throats.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

### OXYMEL IPECACUANHÆ.

#### OXYMEL OF IPECACUANHA.

Liquid Extract of Ipecacuanha ...	...	2·50
Oxymel, sufficient to produce...	...	100·00

Add the liquid extract of ipecacuanha to the oxymel.

Oxymel of ipecacuanha is employed as an expectorant in croup and in the bronchial ailments of children.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### OXYMEL SCILLÆ.

#### OXYMEL OF SQUILL.

Squill, bruised ...	...	6·75
Acetic Acid ...	...	6·75
Distilled Water...	...	21·6
Clarified Honey, sufficient to produce ...	...	100·00

Mix the acid with the water and digest the drug in the mixture for seven days; then pour off the liquid, press the residue, filter the mixed liquids, which should measure about 27, and add sufficient honey to the filtrate to produce a preparation of specific gravity 1·320.

Oxymel of squill is employed in coughs and colds to assist expectoration. It has the cardiac action of digitalis.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—A preparation which corresponds closely with the official Oxymel Scillæ is obtained by mixing 7·5 of liquid extract of squill with 7·5 of acetic acid and 85 of clarified honey (specific gravity, 1·4).



**OXYMEL URGINEÆ.**

## OXYMEL OF URGINEA.

Urginea, bruised	...	...	...	...	6·75
Acetic Acid	...	...	...	...	6·75
Distilled Water...	...	...	...	...	21·6
Clarified Honey, liquefied, sufficient to produce					100·00

Mix the acid with the water, and digest the drug in the mixture for seven days; then pour off the liquid, press the residue, filter the mixed liquids, which should measure about 27, and add sufficient honey to the filtrate to produce, when mixed, a preparation of specific gravity 1·320.

Oxymel of urguinea has similar properties to oxymel of squill. It is official in India and the Eastern Colonies.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**PANCREATINUM.**

## PANCREATIN.

Pancreatin is a mixture of at least four soluble ferments, more specifically called enzymes, viz., trypsin, amylopsin, steapsin, and a milk-curdling enzyme, obtained from the fresh and healthy pancreas or sweetbread of the hog, *Sus scrofa*, Linn., or the ox, *Bos taurus*, Linn. (Order Ungulata). These enzymes do not exist as such in the cells of the pancreas, but are derived from the zymogens during the digestive process. The more carefully the pancreatin is prepared, the less likely is it to contain active ferments, this being due to the zymogens remaining unchanged. In order to convert the zymogens to enzymes it is necessary that they should be acted upon by enterokinase, a ferment found in the duodenum. A filtered aqueous extract of duodenum contains a large quantity of enterokinase, and pancreatin which has been accidentally contaminated may thus be active, whilst a more carefully made pancreatin may be comparatively inactive. The mixture of enzymes may be extracted by means of water or very dilute hydrochloric acid, the mixed enzymes being precipitated from the resulting solution by the addition of strong alcohol; the precipitate is freed from excess of liquid by pressure, and dried at a temperature not exceeding 40°. Fat may be removed if necessary by treatment with benzene or petroleum ether. The pancreatin can be obtained in scales by spreading a clear, syrupy solution in thin layers on glass plates, and allowing it to evaporate in an atmosphere free from dust.

It occurs as a yellowish, cream-coloured, or greyish-white amorphous powder, or in transparent, brittle yellowish scales, with a faint, peculiar, but not unpleasant odour, and a somewhat meat-like taste. It is hygroscopic, and when exposed to the air for some time loses its activity. Slowly and almost entirely soluble in water, and containing not more than 10 per cent. of substances insoluble in that solvent; insoluble in alcohol. More than traces of mineral acids or large amounts of alkalies render it inert. Alkali carbonates

increase the activity, but the digestive power of pancreatin is destroyed by contact with pepsin in acid solution. When dissolved in water, it is precipitated by heat, mineral acids, metallic salts, strong alcohol, and tannic acid, but not by saturated solution of sodium chloride, in this last respect differing from pepsin. Pancreatin may be assayed by the following process:—Add 28 centigrams of pancreatin and 1·5 grammes of sodium bicarbonate to 100 mls of tepid water contained in a flask, then add 400 mls of fresh cow's milk, which has previously been heated to 38°, and maintain the temperature of the mixture at this point for thirty minutes; the milk should be so completely peptonised that, if a small portion of it be transferred to a test-tube and mixed with some nitric acid, no coagulation should occur. Introduce 7·5 grammes of starch into a flask, add 120 mls of distilled water, and boil until a translucent mixture results. Cool to 40·5°, and add 0·3 gramme of the pancreatin previously dissolved in about 10 mls of distilled water at 40·5°. Shake well, maintaining the temperature of the mixture at 40·5° for five minutes; at the end of this time all the starch should be converted into substances soluble in water, and a thin liquid should be produced. Mix 1 decimil of decinormal iodine solution with 60 mls of distilled water, and add to it 1 decimil of the converted starch solution; no colour should result, or, at most, a wine-red colour, showing the presence of dextrin and maltose. The appearance of a blue or purple colour indicates the presence of unconverted starch, and shows that the pancreatin is not capable of converting twenty-five times its own weight of starch into substances soluble in water.

Pancreatin has proteolytic, amylolytic or diastasic, emulsifying, and milk-curdling properties. Trypsin is a proteolytic enzyme, which dissolves coagulated white of egg slowly, but acts with great rapidity on soluble proteids such as the casein of milk. It acts in neutral and slightly acid media, but best in alkaline solution, is most active between the temperatures of 37° and 40°, and its activity continues up to 50°, above which it rapidly diminishes, and ceases altogether at 75°. Amylopsin, or pancreatic diastase, is an amylolytic enzyme, converting starch into dextrin and maltose, and acts best in neutral or slightly alkaline media; its activity is greatest between 30° and 45°, and is destroyed at 65°. Steapsin, or lipase, emulsifies fats, and splits them into glycerol and free fatty acids, which unite with alkaline bases to form soaps. It is rapidly destroyed by strong alcohol and by all acids, except the fatty acids, being the most delicate of the pancreatic enzymes. The milk-curdling enzyme causes milk to clot, but the effect differs somewhat from that produced by the rennin of the stomach.

Pancreatin is administered in conditions of defective nutrition, where there is supposed deficiency of pancreatic secretion, as in diabetes and cancer. It is also employed for its digestive action upon starchy and proteid foods. *Liquor Pancreatis* and *Pulvis Pancreatis Compositus* are employed to peptonise milk, gruel, beef tea, nutrient enemata, etc., previous to administration to

infants, invalids, and those with weak digestion. For internal use as an aid to digestion, pancreatin is given as a powder, or enclosed in cachets, before or at the beginning of a meal, sodium bicarbonate being usually added to postpone the destructive action of the gastric juice upon the ferments. It may also be prepared in pills, coated with keratin or in gelatin capsules, rendered insoluble in the stomach by coating with keratin, or by dipping in solution of formaldehyde. Glycerin of pancreatin is a liquid form for internal use. Capsules or pills of pancreatin specially designed for intestinal solution are the best forms for administration. Solutions for hypodermic use, containing the proteolytic and amylolytic ferments of the pancreas, are also prepared.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

### PAPAINUM.

PAPAIN.

*Synonym.*—Papayotin.

Papain is an impure enzyme of considerable power, prepared from the juice of the unripe fruit of *Carica Papaya*, Linn. (N.O. Cucurbitaceæ), a native of South America, the West Indies, and other tropical parts. The juice is always more or less acrid or even vesicant, but processes for destroying its acidity weaken its digestive properties. The impure enzyme is usually obtained by adding to the freshly drawn milky juice twice its bulk of alcohol, the precipitate formed being drained and dried. By dissolving this crude papain in water and re-precipitating with alcohol it is obtained as a light-coloured product. The colour is to some extent indicative of its quality, as generally the lighter the colour the more active the preparation.

It occurs as an amorphous or slightly granular powder, varying in colour from white to light brown, very liable to change, odourless when prepared as above, and having a faint pepsin-like taste. Soluble in water and in glycerin, insoluble in alcohol. It possesses a solvent action on animal proteids, and acts in acid, alkaline, or neutral media. The activity of the enzyme, though checked in presence of alcohol, is less susceptible to destruction by such anti-zymotics as glycerin, carbolic acid, salicylic acid, etc., than is pepsin; indeed they have been used as preservatives. Its proteolytic action is similar to that of pepsin in producing peptones from albumin or fibrin. It is most active when working in a relatively small quantity of liquid, dilution of the digestive solution having a very marked retarding influence on the progress of the hydrolysis. For the determination of its digestive power blood fibrin in slightly alkaline solution is mostly used, and the digestion carried on at a temperature of about 45° to 50°. A good sample should dissolve 200 to 250 times its weight of blood fibrin in four to five hours. The activity of papain in solution is destroyed at about 82°; in the dry state, however, it is much more stable and may be heated to 100° without being destroyed. It is stated that a solution of 2 decigrams in 4 mls of



water with 1 mil of nitric acid (specific gravity, 1.153), filtered, after standing for one hour, should not be rendered turbid by a solution of tannin (5 per cent.).

Papain is employed to assist proteid digestion in chronic dyspepsia, gastric fermentation, and gastritis. Its action is preserved both in the stomach and intestines. It may be given in powders or enclosed in a cachet, or in solution as Elixir Papaini or Glycerinum Papaini. Lozenges are also prepared, containing 1 grain in each, and pills may be made with syrup of glucose as an excipient. Solutions of papain (10 per cent.) are applied to diphtheritic membrane, and to digest dead tissue and promote healing of abscesses, ulcers, and fissures of the tongue. Solutions of a similar strength have been recommended for injection into tumours, malignant and benign, to promote their absorption.

*Dose.*—1 to 6 decigrams (2 to 10 grains).

*NOTES.*—Some commercial varieties of papain act best in alkaline solutions, while others are most active in acid solution.

## PAPAVERIS CAPSULÆ.

### POPPY CAPSULES.

*Synonym.*—Poppy Heads.

Poppy capsules are the dried fruits of *Papaver somniferum*, Linn. (N.O. Papaveraceæ). They are cut from the stems when nearly ripe, before the seeds have escaped and dried.

They are ovoid or nearly globular in shape, sometimes depressed at the base and apex, 5 to 7.5 centimetres in diameter, crowned by a large stellate stigma, and contracted at the base into a neck which is enlarged near the peduncle; pale yellowish-brown in colour and often marked with darker spots. From the inner surface of the thin, brittle pericarp, membranous placentas project into the cavity of the fruit. The seeds are numerous, small, white, reniform and marked with conspicuous raised reticulations. The capsules have no odour, but a slightly bitter taste.

The most important constituent of poppy capsules is the alkaloid morphine, of which they contain about 0.16 to 0.28 per cent. Meconic acid has also been detected in them, and codeine, narcotine, and other constituents of opium are probably also present. Whether the ripe or unripe capsules contain most morphine is undecided, the analyses showing great divergence. The seeds are devoid of alkaloid, but contain about 50 per cent. of a drying oil, which is used by artists and for various technical purposes; they should be rejected in making galenical preparations of poppy capsules. The slate-coloured seeds of a variety of poppy with dark petals are known as maw seed.

Poppy capsules are mildly sedative by virtue of the small proportion of the principles of opium they contain, but are very uncertain in strength. They are employed in the preparation of

fomentations for bruises, and for dental and other abscesses. Decoctum Papaveris is similarly employed, and is also used as a vehicle for urethral injections, but it should be remembered that morphine acts on the brain, and only after absorption. Syrupus Papaveris is a mild sedative for use in cough mixtures.

### PARA COTO CORTEX.

#### PARA COTO BARK.

Para coto bark is obtained from an unknown tree, probably a species of *Cryptocarya* (N.O. Laurineæ).

The dried bark occurs in pieces which are often of considerable size and thickness (up to 30 centimetres long, 10 centimetres wide, and 1.5 centimetres thick). The outer surface is of a reddish-brown or cinnamon-brown colour. It is sometimes fissured longitudinally and transversely, sometimes nearly smooth, and bears occasional patches of whitish cork. The inner surface is coarsely striated. It breaks with a fibrously splintery fracture, and the smoothed transverse section exhibits a thin, brown cork within which is a narrow cortex separated by a line of sclerenchymatous cells from the very thick bast, which is well characterised by the presence of abundant groups of sclerenchymatous cells. The odour is spicy and characteristic, the taste aromatic and pungent.

The chief constituent is paracotoin, an indifferent, crystalline, bitter principle, obtainable in yellow scales, which assume a yellowish-brown colour with nitric acid. Other less important constituents are hydrocotoin, methylhydrocotoin, protocotoin, methyl-protocotoin (oxyleucotin), phenylcoumalin, piperonylic acid, volatile oil, resin, tannin, etc.

Para coto bark is not employed in medicine except as a substitute for true coto bark. Paracotoin has been given for the same purposes as cotoin, in doses of 6 to 18 centigrammes (1 to 3 grains).

NOTES.—Para coto bark is exported from Pará, at the mouth of the Amazon, and should be called "Pará Coto Bark," not as is commonly done, "paracoto" bark. True coto bark is imported from Bolivia, and so closely resembles paracoto bark that the sole definite means of distinguishing lies in extracting the chief active constituent, cotoin, and testing it with nitric acid; cotoin will assume a blood-red colour, whereas paracotoin will turn yellowish-brown. This test may be carried out by extracting with ether, evaporating the ethereal solution in the presence of water, shaking with petroleum spirit, filtering the aqueous liquid, and evaporating to dryness. The residue is then dissolved in a little glacial acetic acid, and a drop of fuming nitric acid added. In the case of true coto bark, the blood-red colour mentioned above will be produced. True coto bark contains cotoin, which produces the characteristic colour reaction, piperonylic acid, volatile oil, resin, tannin, etc.

### PARADISI GRANA.

#### GRAINS OF PARADISE.

*Synonym.*—Guinea Grains.

Grains of Paradise are the seeds of *Amomum Melegueta*, Roscoe (N.O. Scitamineæ), an herbaceous plant, indigenous to tropical West Africa.

These seeds are about 3 millimetres long, pyramidal or bluntly angular in shape, and with a hard, reddish-brown, shining, shagreen-like surface. Attached to one extremity are the paler fibrous remains of the seed-stalk. The transverse section exhibits a large, white, starchy perisperm, surrounding a small, yellowish, horny endosperm, in which the minute embryo is imbedded. Odour faintly aromatic; taste intensely pungent.

The seeds contain a yellowish, pungent, oily body, paradol, and about 0.5 per cent. of volatile oil (specific gravity, 0.894;  $n_D = -3.58$ ; the major portion boils at  $257^\circ$  to  $258^\circ$ ).

Grains of Paradise are employed in veterinary practice as a substitute for cardamoms. They have also been used to give artificial strength to fermented liquors.

### PARAFFINUM ALBUM.

#### WHITE PARAFFIN.

*Synonyms.*—Petrolatum Album; White Petrolatum.

White paraffin is a colourless mixture of hydrocarbons, chiefly of the methane series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue (see Paraffinum Molle).

It occurs as a white, unctuous mass, transparent in thin layers, and without odour or taste. In other respects, it possesses the characters and responds to the tests described under Paraffinum Molle.

White paraffin is preferred when white ointments are required, but does not possess any other advantage over the yellow variety.

### PARAFFINUM CARBOLISATUM.

#### CARBOLISED PARAFFIN.

Carbolic Acid	...	...	...	...	3.00
Soft Paraffin, sufficient to produce	...	...	...	...	100.00

Dissolve the carbolic acid in the soft paraffin.

This preparation is an antiseptic application for wounds, and for use in lubricating catheters and other instruments.

### PARAFFINUM DURUM.

#### HARD PARAFFIN.

*Synonyms.*—Paraffinum; Paraffin; Paraffin Wax.

Hard paraffin is a mixture of the harder members of the paraffin series of hydrocarbons, having the general formula  $C_nH_{2n+2}$ , ranging from  $C_{21}H_{44}$  to  $C_{30}H_{62}$ . Hydrocarbons, however, other than



those of the paraffin series, are present in notable proportions. It is chiefly obtained from the crude tarry oil produced by the destructive distillation of shale. The oil is redistilled, the distillate shaken with sulphuric acid to remove basic bodies and afterwards with solution of sodium hydroxide to remove acid substances and phenols. The product is washed, and on redistillation yields various kinds of burning and lubricating oils and finally a thick oil which deposits paraffin on cooling. The crude wax is separated by pressure and dissolved in naphtha, being again crystallised from the solution by refrigeration and separated by pressure. The wax is then melted and filtered through animal charcoal to decolourise.

It occurs as a colourless, translucent, crystalline, wax-like solid, inodorous, tasteless, and slightly unctuous to the touch. Insoluble in water, slightly soluble in absolute alcohol and in ether; soluble in benzene, chloroform, carbon bisulphide, volatile oils, and warm fixed oils. Specific gravity, 0·820 to 0·940 (0·890 to 0·905 at 25°); melting-point, 54·4° to 57·2°. The melting-point and hardness increase as the molecular weight increases. It expands considerably on melting and in the molten state is a colourless oil; when heated strongly in the air it burns with a luminous flame, though not readily, liberating carbon, but leaving no fixed residue. An alcoholic solution should not redden litmus paper. It is characterised by a marked indifference to most reagents. Concentrated sulphuric or nitric acids have no effect in the cold. If 5 decigrams be heated and 1 decigram of powdered fuchsin added to the melted substance, the latter should not assume a pink or red colour (absence of stearic acid).

Hard paraffin is employed principally in the preparation of ointment bases, for use with medicaments that are not required to be absorbed (see *Unguentum Paraffini*). Hard paraffin of melting-point 43·3° to 46°, sterilised by heat, is used in plastic operations, especially to correct nasal deformities.

NOTES.—Paraffin of lower melting-point than the above is used for embedding substances for cutting microscopic sections. A hard paraffin (white) is prepared by purifying ozokerite, a natural mineral wax found in Galicia. It has a melting-point 54·4°, and is sold under the name "Ceresin." When artificially coloured it resembles yellow beeswax and is sold as "Yellow Ceresin."

## PARAFFINUM LIQUIDUM.

### LIQUID PARAFFIN.

*Synonyms.*—*Petrolatum Liquidum*; *Liquid Petrolatum*.

Liquid paraffin consists chiefly of a mixture of hydrocarbons belonging to the methane series; it is obtained from petroleum by distilling off most of the lighter fractions, and purifying the liquid residue.

It occurs as a colourless, oily, transparent liquid, odourless when cold, but having a faint petroleum odour when heated, tasteless, non-fluorescent. Insoluble in water and in cold alcohol, soluble in boiling absolute alcohol, very soluble in ether, chloroform, carbon disulphide, amyl alcohol, benzene, petroleum benzine, oil of turpentine, the fixed and volatile oils; dissolves bromine, iodine, iodoform, phosphorus; alkaloids and their salts are only slightly dissolved by it, but the addition of oleic acid materially increases the solubility. The specific gravity is officially given as 0.885 to 0.890 (0.870 to 0.940 at 25°), but it is more generally found in commerce about 0.875 or even somewhat lower. Boiling-point, not below 360°. On boiling with alcohol the latter should have no acid reaction on litmus. When heated on platinum foil it is completely volatilised, and should not give off acrid vapours. If 3 mls be added to an equal volume of sulphuric acid in a test-tube, and the tube placed in boiling water for ten minutes, with frequent agitation, the separated layer of acid should not be coloured of a deeper tint than pale brown. A mixture of 4 mls of liquid paraffin with 2 of absolute alcohol and 1 decimil of clear saturated solution of lead oxide in sodium hydroxide solution should remain colourless when kept at 70° for ten minutes (absence of sulphur compounds).

Liquid paraffin is bland and unirritating when applied to mucous surfaces. It is largely employed as a vehicle for oily spray solutions, containing menthol, thymol, and the volatile oils. For the preparation of solutions of the alkaloids, almond oil is better, or almond oil, 1 part, may be mixed with liquid paraffin, 2 parts. The commercial varieties of liquid paraffin having a specific gravity rather lower than the official standard, are preferred for use in sprays, as, being less viscous, they are more readily broken up by the spray apparatus into the necessary fine particles for projection into the air passages. It is a suitable vehicle in which to suspend insoluble salts, such as calomel, mercury salicylate, etc., for hypodermic injection. Liquid paraffin is used as an emollient to the skin in irritable conditions, and to remove desquamative crusts; it is erroneously regarded as a nutritive application for the hair, and forms the basis of many brilliantines. Liquid paraffin is administered internally as a substitute for cod-liver oil in phthisis and other conditions of malnutrition (see *Emulsio Petrolei cum Hypophosphitibus*). It is incapable of saponification, but may be emulsified and absorbed through the intestinal wall without actually becoming incorporated with the tissues; it acts as a lubricant during excretion, and has been found of service in colitis. It is not a food, and cannot, therefore, act as a substitute for cod-liver oil. Liquid paraffin can be sterilised by heating it for half an hour at 120° to 140°, in small flasks, or bottles, the necks of which are tightly plugged with cotton wool.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTE.*—Liquid paraffin is also known under the following trade-names:—Adepsine Oil, Alboline, Atoleine, Chrismaline, Glymol, Oleum Adepsinæ Album. Oleum Deelinæ, Oleum Petrolei, Paroleine, Saxol, and Vaseline Oil.

**PARAFFINUM MOLLE.**

## SOFT PARAFFIN.

*Synonyms.*—Petrolatum; Petrolatum Molle.

Soft paraffin is a mixture of various paraffin hydrocarbons, usually obtained by purifying the residue left when crude petroleum is distilled by successive treatment with sulphuric acid, sodium hydroxide, and charcoal.

It occurs as a semi-solid, white or yellow, translucent mass, bland, inodorous, tasteless, soft, unctuous to the touch, and free from acidity or alkalinity. Insoluble in water, slightly soluble in alcohol, freely soluble in ether, chloroform, benzol, oil of turpentine, fixed and volatile oils. It readily dissolves thymol, menthol, salicylic acid, phenol (about 1 in 20), atropine (1 in 120), cocaine (1 in 100), morphine (1 in 200), quinine (1 in 80), veratrine (1 in 80), the oleic acid solutions of the alkaloids in all proportions; when melted it mixes with oils, fats, hard paraffin, oleates, oleic acid, etc. Specific gravity at the melting point, 0.840 to 0.870 (0.820 to 0.850 at 25°). Melting point, 35.5° to 39°, or even somewhat higher; it can be obtained with a melting-point of 42°, and such a preparation is preferable to a mixture of soft and hard paraffin with the same melting-point. When melted, soft paraffin occasionally exhibits fluorescence; on increased heating it volatilises without giving off any acrid vapours, and burns with a bright flame, leaving no residue. No unpleasant odour or flavour should be developed on heating to 50°. On boiling with solution of sodium hydroxide the aqueous liquid should yield no precipitate or oily matter on the addition of excess of acid (absence of fixed oils, fats, and resin).

Soft paraffin is not irritating to the skin, is unoxidisable, and does not become rancid; the caustic alkalies have no action on it, but it is easily removed from the skin by soap and water. It is not readily absorbed, and is not so suitable a vehicle for drugs that are intended to pass through the skin as hydrous wool fat; it is an excellent emollient, and the best ointment basis for reducible substances, especially mercuric salts. The white and yellow varieties are employed in the preparation of paraffin ointment, according as a white or coloured ointment is required. Paraffin ointment is a protective to the skin; it adheres to the dressing, leaving wounds clean. Ointments prepared with soft paraffin melt at the temperature of the body, and soak into the dressing. Soft paraffin is the best basis for ointments to be applied to the eyes, on account of the absence of acidity; ointments of atropine, eserine, cocaine, etc., may be prepared by dissolving the pure alkaloids in the fat melted at a low temperature. A mixture of hard and soft paraffins is used as a pill excipient (see *Massa Paraffini*). Soft paraffin has been given internally for coughs (1 to 4 grammes, 15 to 60 grains); its action is probably confined to lubricating the intestinal tract.

NOTE.—Soft paraffin is also known under the following trade-names:—Adepsine, Adeps Petrolei, Chrisma, Cosmoline, Fossiline, Geoline, Paraffin Jelly, Petroleum Jelly, Salvo Petrolia, Saxoline, and Vaseline.



**PARAFORMUM.**

## PARAFORM.



*Synonyms.*—Paraformic Aldehyde ; Paraformaldehyde ; Trioxymethylene.

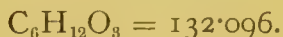
Paraform,  $(\text{CH}_2\text{O})_n$ , is a solid polymer of formic aldehyde. It may be prepared by evaporating or distilling a concentrated aqueous solution of formaldehyde, the residue left being a white porcelain-like mass of the polymer paraform. Polymerisation also occurs on adding to formaldehyde a fourth of its weight of sulphuric acid.

It occurs as a white micro-crystalline or amorphous powder, or as a white, friable, amorphous mass, odourless at ordinary temperatures, but having a pungent smell on heating. It is non-poisonous, and as a germicide superior to  $\beta$ -naphthol. Insoluble in cold water, soluble in boiling water and in solutions of the fixed alkaline hydroxides. With calcium hydroxide it yields formic acid and a fermentable sugar. It combines with the haloid acids. Though it is insoluble in cold water it is readily convertible into its soluble modification formaldehyde. At ordinary temperatures it is fairly volatile in air, about 50 per cent. volatilising in twenty-four hours, but it is much more volatile on heating, giving off vapours of formaldehyde. On this account it is convenient for the application of formaldehyde as a disinfectant. It volatilises at  $100^\circ$  and is readily converted into formaldehyde when heated to this temperature in the presence of water.

Paraform is employed to disinfect rooms, either by vaporising the tablets, 1 gramme in each, in a special lamp, or by means of sulphur candles containing paraform. About 20 grammes of paraform are required to disinfect thoroughly 1000 cubic feet of enclosed space. It is also used to keep catheters and other surgical instruments aseptic by enclosing them with paraform in air-tight containers. It is used whenever formaldehyde is required to be put up in solid form, as in tablets for taking internally, or for preparing antiseptic solutions. Paraform suspended in collodion (25 per cent.) has been recommended as an efficacious application for warts.

**PARALDEHYDUM.**

## PARALDEHYDE.



Paraldehyde is a polymer of acetaldehyde,  $\text{CH}_3\text{COH}$ . It may be prepared from ordinary aldehyde by treating it at the normal temperature with small quantities of hydrochloric acid, sulphurous anhydride, or zinc chloride, the temperature of the liquid rising, with almost complete conversion into paraldehyde.

It occurs as a colourless, transparent liquid at ordinary temperatures, having a peculiar, characteristic but not unpleasant, penetrating, ethereal odour, and an acrid, pungent, and subsequently cooling taste. The odour is not so suffocating as that of aldehyde. At about  $0^{\circ}$  it is a solid crystalline mass. Soluble in cold water (1 in 8.5), the solution becoming turbid on heating, and, on boiling, about half of the dissolved paraldehyde separating out; soluble in all proportions of alcohol, ether, fixed and volatile oils. Specific gravity, 0.995 to 0.998 (0.990 at  $25^{\circ}$ ). Boiling-point,  $123^{\circ}$  to  $125^{\circ}$ , with evolution of inflammable vapours. Melting-point, about  $10^{\circ}$ ; it may be cooled, however, to considerably below its melting-point without solidifying unless it is stirred while the temperature is falling. The aqueous solution should be neutral or only slightly acid. On distilling with sulphuric acid it is reconverted into aldehyde. On warming a saturated aqueous solution with solution of ammoniacal silver nitrate, metallic silver is deposited on the sides of the tube as a mirror. It should completely volatilise on the water-bath without leaving any disagreeable odour. One mil should form with 10 mils of water a clear solution free from oily drops (absence of amyl alcohol, etc.). A mixture of 8 mils with 8 mils of alcohol and 1 drop of solution of phenol-phthalein should acquire a pink colour on the addition of 5 decimils of normal solution of potassium hydroxide (limit of free acid). It should give no colouration on standing for twelve hours with a solution of potassium hydroxide (absence of aldehyde); this is a very delicate test, and perhaps too severe, as few commercial samples will answer it. It should give no characteristic reaction with the tests for sulphates or chlorides. Acidity may be removed by treatment with excess of sodium bicarbonate and dehydration over dried potassium carbonate, and it may be further purified by redistilling and rejecting the first 10 per cent. of distillate.

Paraldehyde is a hypnotic resembling chloral in its action, but it has no depressant effect on the heart, and does not give rise to excitement. On account of its greater volatility, it is more speedy than chloral in its action. It is especially useful in mental and cardiac disease, and is a valuable remedy in spasmodic asthma, dilating the bronchioles by its depressant action on the medullary vagal centre. Its odour, owing to partial excretion by the lungs, is perceptible in the breath for many hours after the dose has been taken, and its taste is objectionable. It may give rise to an erythematous rash, and large doses sometimes irritate the alimentary canal. Paraldehyde may be given in mixture form, and is best dissolved, on account of its pungent taste, in at least 16 parts of water. In greater concentration than 1 in 9, it may be suspended with compound tragacanth powder. It is sometimes prescribed with *Mistura Amygdalæ*, but such mixtures frequently explode spontaneously. Its taste may be disguised with tincture of orange or cinnamon water. Capsules of paraldehyde are prepared, containing 20 or 30 minims in each.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

**PAREIRÆ RADIX.**

## PAREIRA ROOT.

*Synonyms.*—Pareira; Pareira Brava.

Pareira root is obtained from *Chondrodendron tomentosum*, Ruiz and Pavon (N.O. Menispermaceæ), a climbing plant indigenous to Peru and Brazil. It occurs in more or less tortuous, heavy cylindrical pieces from 2 to 5 centimetres or more in diameter, almost black in colour, and marked with longitudinal furrows and transverse ridges and fissures. The transverse section exhibits a central column composed of ten to twenty wedges of wood containing large vessels; surrounding the central column are three or four zones separated from each other by light coloured, wavy lines, and each consisting of sparsely distributed wood bundles separated by wide, dense, wavy medullary rays. The drug has a bitter taste, but no odour.

The root contains from 0·5 to 3 per cent. of an alkaloid identical with the beberine of bebeeru bark, and formerly called pelosine. It is also remarkable for the large quantity of free fatty acids (9 per cent.), chiefly stearic acid, which it contains. Other constituents of the root are tannin and abundant starch. It yields about 4 per cent. of ash, and more than 10 per cent. of aqueous extract.

Pareira root is employed as a simple bitter, and as an astringent and diuretic in catarrhal affections of the genito-urinary system, gonorrhœa, cystitis, and leucorrhœa. It is used principally in the form of liquid extract and decoction.

NOTES.—Much of the commercial drug is not genuine, the chief substitute being the root of a Brazilian menispermaceous plant closely allied to *Chondrodendron*; this drug is in straighter, brownish pieces, which are not so heavy; the section is much less waxy and exhibits more numerous, narrower zones, the vessels in which are about half the diameter of those of the genuine; it has also a less bitter taste and yields less aqueous extract. The stems of true pareira are paler in colour, bear lichens, have a more or less warty surface, and exhibit a well-defined pith.

**PARENOL.**

## PARENOL.

*Synonym.*—Solid Parenol.

Soft Paraffin, white or yellow...	...	...	65·00
Wool Fat	...	...	15·00
Distilled Water, warm, sufficient to produce...	...	...	100·00

Melt the soft paraffin and wool fat, pour the mixture into a warm mortar, and add gradually the distilled water.

Parenol is a stable emulsion of soft paraffin, which is absorbed readily by the skin, and causes no irritation. It does not become rancid on keeping, and forms a useful vehicle for the application of various medicaments, for which rapid absorption is desired. Parenol can be made to take up more than its own weight of water, and mixes readily with all fats.



**PARENOL LIQUIDUM.**

## LIQUID PARENOL.

Liquid Paraffin ...	...	...	...	70·00
White Beeswax...	...	...	...	5·00
Distilled Water, warm, sufficient to produce...				100·00

Melt the white beeswax in the liquid paraffin, pour the mixture into a warm mortar, and add gradually the distilled water.

Liquid parenol is a neutral liniment, which is readily absorbed by the skin. It possesses properties similar to those of solid parenol, and will be found especially useful in the treatment of skin diseases for lubricating catheters, or as a vehicle for injections.

**PAROGENUM.**

## PAROGEN.

*Synonyms.*—Liquid Parogen ; Vasoliment ; Oxygenated Paraffin.

Liquid Paraffin ...	...	...	...	40·00
Oleic Acid ...	...	...	...	40·00
Ammoniated Alcohol (5 per cent.) ...	...	...	...	20·00

Mix, and agitate until a clear solution is obtained.

Parogen is readily absorbed by the skin, and forms a useful vehicle for medicaments, when it is desired that their action shall not be merely superficial, but the use of parenol or liquid parenol may sometimes be found preferable.

**PAROGENUM CHLOROFORMI CAMPHORATUM.**

## CAMPHORATED CHLOROFORM PAROGEN.

*Synonym.*—Camphorated Chloroform Vasoliment.

Camphor...	...	...	...	37·50
Chloroform...	...	...	...	25·00
Parogen ...	...	...	...	37·50

Dissolve the camphor in the chloroform, and add the parogen.

This preparation is a soothing and mildly rubefacient application for neuralgia, painful rheumatic joints, etc. It may be used as a substitute for Linimentum Chloroformi.

**PAROGENUM CREOSOTI.**

## CREOSOTE PAROGEN.

*Synonym.*—Creosote Vasoliment.

Creosote ...	...	...	...	5·00
Parogen ...	...	...	...	95·00

Mix the creosote with the parogen.

This preparation is applied to the skin in parasitic affections, and as a stimulant in chronic eczema and psoriasis.

**PAROGENUM EMPYREUMATICUM.**

EMPYREUMATIC PAROGEN.

*Synonym.*—Empyreumatic Vasoliment.

Oil of Cade	...	...	...	...	...	25'00
Parogen	...	...	...	...	...	75'00

Mix the oil of cade with the parogen.

This preparation is a powerful antiseptic and anti-pruritic, useful in eczema and psoriasis.

**PAROGENUM EUCALYPTOLIS.**

EUCALYPTOL PAROGEN.

*Synonym.*—Eucalyptol Vasoliment.

Eucalyptol	...	...	...	...	...	20'00
Parogen	...	...	...	...	...	80'00

Mix the eucalyptol with the parogen.

This preparation is an antiseptic and mildly rubefacient application for use in chronic rheumatic affections.

**PAROGENUM GUAIACOLIS.**

GUAIACOL PAROGEN.

*Synonym.*—Guaiacol Vasoliment.

Guaiacol	...	...	...	...	...	20'00
Parogen	...	...	...	...	...	80'00

Mix the guaiacol with the parogen.

This preparation is antiseptic and antiparasitic; it is used in orchitis and for inunction in phthisis.

**PAROGENUM HYDRARGYRI.**

MERCURY PAROGEN.

*Synonym.*—Mercury Vasoliment.

Mercury	...	...	...	...	...	30'00
Wool Fat	...	...	...	...	...	15'00
Thick Parogen	...	...	...	...	...	55'00

Triturate the mercury with the wool fat until metallic globules cease to be visible, and add the thick parogen.

This preparation is used for inunction in syphilis, in parasitic skin diseases, synovitis, and generally as a substitute for mercury ointment.

**PAROGENUM ICHTHAMOLIS.**

ICHTHAMOL PAROGEN.

*Synonyms.*—Ichthamol Vasoliment; Ammonium Ichthosulphonate Parogen.

Ammonium Ichthosulphonate	...	...	...	...	10'00
Parogen, sufficient to produce	...	...	...	...	100'00

Dissolve the ammonium ichthosulphonate in the parogen, and strain after standing awhile.

This preparation is used in eczema and psoriasis as an anti-pruritic and antiseptic.

### PAROGENUM IODI.

#### IODINE PAROGEN.

*Synonyms.*—Iodine Vasoliment ; Linimentum Iodi Petrolatum.

Iodine ...	...	...	...	...	10·00
Oleic Acid ...	...	...	...	...	40·00
Liquid Paraffin ...	...	...	...	...	40·00
Ammoniated Alcohol (10 per cent.) ...	...	...	...	...	10·00

Powder the iodine, and triturate with the oleic acid till dissolved ; then add the liquid paraffin and the ammoniated alcohol.

This preparation is used as a substitute for iodine liniment and ointment. It does not stain or crack the skin, and is rapidly absorbed.

### PAROGENUM IODI DILUTUM.

#### DILUTED IODINE PAROGEN.

*Synonym.*—Diluted Iodine Vasoliment.

Iodine Parogen...	...	...	...	...	60·00
Parogen ...	...	...	...	...	40·00

Mix the two parogens.

This preparation is used when absorption of iodine rather than counter-irritation is required.

### PAROGENUM IODOFORMI.

#### ODOFORM PAROGEN.

*Synonym.*—Iodoform Vasoliment.

Iodoform ...	...	...	...	...	3·00
Parogen, sufficient to produce...	...	...	...	...	100·00

Dissolve the iodoform in the parogen by warming cautiously.

This preparation has been used as an injection into tuberculous abscesses.

### PAROGENUM IODOFORMI DEODORATUM.

#### DEODORISED IODOFORM PAROGEN.

*Synonym.*—Deodorised Iodoform Vasoliment.

Iodoform...	...	...	...	...	3·00
Eucalyptol ...	...	...	...	...	3·00
Parogen, sufficient to produce	...	...	...	...	100·00

Dissolve the iodoform in the parogen by warming cautiously, and add the eucalyptol.

This preparation is used for the same purposes as iodoform ointment.



**PAROGENUM MENTHOLIS.**

MENTHOL PAROGEN.

*Synonym.*—Menthol Vasoliment.

Menthol	...	...	...	...	...	2'00
Parogen, sufficient to produce	...	...	...	...	...	100'00

Dissolve the menthol with the parogen by warming cautiously.

This preparation is applied to the seat of pain in neuralgia, sciatica, lumbago, etc.

**PAROGENUM NAPHTHOLIS.**

NAPHTHOL PAROGEN.

*Synonym.*—Naphthol Vasoliment.

Naphthol	...	...	...	...	...	10'00
Parogen, sufficient to produce	...	...	...	...	...	100'00

Triturate the naphthol with the parogen until dissolved.

This preparation is applied to the skin in eczema, psoriasis, etc., as a stimulant, and in scabies as a parasiticide.

**PAROGENUM PICIS.**

TAR PAROGEN.

*Synonym.*—Tar Vasoliment.

Tar	...	...	...	...	...	25'00
Parogen, sufficient to produce	...	...	...	...	...	100'00

Mix the tar with the parogen.

This preparation is used as an antiseptic in psoriasis, eczema, and chronic skin diseases, in place of tar ointment.

**PAROGENUM SALICYLATUM.**

SALICYLATED PAROGEN.

*Synonym.*—Salicylated Vasoliment.

Salicylic Acid	...	...	...	...	...	10'00
Parogen, sufficient to produce	...	...	...	...	...	100'00

Powder the salicylic acid and triturate with the parogen until dissolved.

This preparation is applied to foul ulcers and in such chronic skin diseases as eczema and psoriasis. It may also be used as a local application to rheumatic joints.

**PAROGENUM SPISSUM.**

THICK PAROGEN.

*Synonym.*—Thick Vasoliment.

Hard Paraffin	...	...	...	...	...	12'00
Liquid Paraffin	...	...	...	...	...	48'00
Oleic Acid	...	...	...	...	...	30'00
Ammoniated Alcohol (10 per cent.)	...	...	...	...	...	10'00

Melt the hard paraffin on a water-bath, add the liquid paraffin, the oleic acid, and ammoniated alcohol, and continue the heat until the resulting product weighs 90.

Thick parogen may be used as an ointment basis when absorption of a drug by the skin is required, but the use of parenol may sometimes be found preferable.

### PAROGENUM SULPHURIS.

#### SULPHUR PAROGEN.

*Synonym.*—Sulphur Vasoliment.

Sublimed Sulphur	...	...	...	...	3'00
Linseed Oil	...	...	...	...	37'00
Parogen, sufficient to produce...	...	...	...	...	100'00

Dissolve the sulphur in the oil by the aid of heat, and add the parogen.

This preparation is used in place of sulphur ointment in parasitic skin diseases.

### PAROGENUM SULPHURIS COMPOSITUM.

#### COMPOUND SULPHUR PAROGEN.

*Synonym.*—Compound Sulphur Vasoliment.

Sulphur Parogen	...	...	...	...	10'00
Oil of Cade	...	...	...	...	10'00
Thymol	...	...	...	...	0'30
Eucalyptol	...	...	...	...	3'00
Oil of Turpentine	...	...	...	...	30'00
Parogen, sufficient to produce...	...	...	...	...	100'00

Mix the thymol and eucalyptol with the oils, then add the parogens.

This preparation is antiseptic and parasiticide; it is useful in chronic skin diseases.

### PAROGENUM TEREBINTHINÆ.

#### TURPENTINE PAROGEN.

*Synonym.*—Turpentine Vasoliment.

Venice Turpentine, Factitious	...	...	20'00
Parogen, sufficient to produce	...	...	100'00

Mix the turpentine with the parogen.

This preparation is a stimulant and rubefacient application for the skin.

**PASTA HAMAMELIDIS.**

## HAMAMELIS PASTE.

*Synonym.*—Witch Hazel Snow or Foam.

Stearic Acid	...	...	...	...	10·00
Sodium Carbonate	...	...	...	...	1·50
Glycerin	...	...	...	...	1·50
Solution of Hamamelis, by weight	...	...	...	...	50·00
Distilled Water, sufficient to produce, by weight	...	...	...	...	100·00

Melt the stearic acid on a water-bath, add the sodium carbonate and glycerin, dissolved in 5 of hot water, and continue the application of heat for an hour, with constant stirring; then remove from the source of heat, make up the weight to 50 with distilled water, and add 50 by weight of solution of hamamelis. Heat the mixture for about a minute, and stir until smooth, then transfer it to a warm mortar and beat to a foam.

This preparation is an excellent toilet application for the skin.

**PASTA ICHTHAMOLIS.**

## ICHTHAMOL PASTE.

*Synonym.*—Ammonium Ichthosulphonate Paste.

Ammonium Ichthosulphonate	...	...	...	10·00
Gelatin	...	...	...	10·00
Glycerin, by weight	...	...	...	60·00
Distilled Water	...	...	...	25·00

Soak the gelatin in the distilled water until softened; then melt on a water-bath, add the glycerin, and finally the ammonium ichthosulphonate.

Used for application to the skin in acne, psoriasis, and eczema. The jelly is melted by standing in hot water, and applied to the skin with a stiff brush, the paste being afterwards covered with a thin layer of cotton wool.

NOTE.—This preparation is sometimes made with twice the quantity (20 per cent.) of ammonium ichthosulphonate.

**PASTA ICHTHAMOLIS COMPOSITA.**

## COMPOUND ICHTHAMOL PASTE.

*Synonym.*—Compound Ammonium Ichthosulphonate Paste.

Ammonium Ichthosulphonate	...	...	25·00
Carbolic Acid	...	...	2·50
Starch, in powder	...	...	50·00
Distilled Water, warm	...	...	22·50

Dissolve the ammonium ichthosulphonate and carbolic acid in the warm water, and mix with the starch.

This paste is used in acne rosacea; it is painted on the skin and allowed to dry.



**PASTA IODI ET AMYLI.**

## IODINE AND STARCH PASTE.

Starch, in powder	...	...	...	...	10'00
Glycerin	...	...	...	...	20'00
Diluted Solution of Iodine	...	...	...	...	10'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Boil together the starch, glycerin, and distilled water; cool, and add the solution of iodine; add sufficient water to produce 100; mix well.

This paste is applied on lint to syphilitic sores and ulcers.

**PASTA LUBRICANS.**

## LUBRICANT PASTE.

*Synonym.*—Catheter Paste.

Carbolic Acid	...	...	...	...	3'00
Glycerin	...	...	...	...	10'00
Tragacanth	...	...	...	...	2'50
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the carbolic acid in 80 of the water; then mix the glycerin with the tragacanth, add the aqueous solution gradually with constant trituration, and make up the required volume by the addition of distilled water.

This paste is used as an antiseptic lubricant for catheters.

**PASTA POTASSÆ ET CALCIS.**

## POTASH AND LIME PASTE.

*Synonym.*—Pasta Potassæ cum Calce; Vienna Paste.

Potassium Hydroxide	...	...	...	...	50'00
Calcium Hydroxide	...	...	...	...	50'00
Alcohol, a sufficient quantity.	...	...	...	...	

Powder the calcium and potassium hydroxides and mix with sufficient of the alcohol to form a paste.

This paste was formerly used as a caustic for malignant growths. It is sometimes prepared with glycerin in place of alcohol.

NOTES.—Pasta Londinensis is a mixture of equal parts of caustic soda and unslaked lime in fine powder, made into a paste with water when required for use. It is said to be a less painful application than Vienna paste.

**PASTA RESORCINI.**

## RESORCIN PASTE.

*Synonym.*—Lassar's Stronger Resorcin Paste.

Resorcin	...	...	...	...	20'00
Zinc Oxide	...	...	...	...	20'00
Starch, in powder	...	...	...	...	20'00
Liquid Paraffin	...	...	...	...	40'00

Mix the powders, and add the liquid paraffin.

This paste is used in acne, eczema, and psoriasis.

**PASTA RESORCINI MITIS.**

MILD RESORCIN PASTE.

*Synonym.*—Lassar's Mild Resorcin Paste.

Resorcin...	...	...	...	...	10'00
Zinc Oxide	...	...	...	...	25'00
Starch, in powder	...	...	...	...	25'00
Liquid Paraffin...	...	...	...	...	40'00

Mix the powders, and add the liquid paraffin.

**PASTA THEOBROMATIS.**

THEOBROMA PASTE.

*Synonym.*—Chocolate.

Theobroma paste, or chocolate, is a mixture of the finely powdered nibs of *Theobroma Cacao*, Linn., with sugar, and vanilla or other suitable flavouring.

It occurs as a sweet reddish-brown paste or mass with an agreeable flavour, containing about 25 per cent. of oil of theobroma, and not more than 50 per cent. of sugar, without starch in quantity, or gum, or other addition.

Chocolate is used in the preparation of *Tabellæ Trinitrini* and *Trochisci Phenolphthalein*. Its agreeable flavour and preservative action also render it useful as a basis for administering erythrol nitrate, methylacetanilide, menthol, pepsin, santonin, bismuth preparations, and such alkaloids as apomorphine, caffeine, and cocaine.

**PASTA ZINCI COMPOSITA.**

COMPOUND ZINC PASTE.

*Synonym.*—Lassar's Paste.

Zinc Oxide	...	...	...	...	24'00
Starch	...	...	...	...	24'00
Salicylic Acid	...	...	...	...	2'00
Soft Paraffin, white	...	...	...	...	50'00

Mix to form a paste or ointment.

This paste is used as an application for inflammatory skin diseases.

**PASTA ZINCI ET GELATINI.**

ZINC AND GELATIN PASTE.

*Synonyms.*—*Gelatinum Zinci*; *Unna's Paste*.

Gelatin	...	...	...	...	15'00
Distilled Water	...	...	...	...	35'00
Zinc Oxide	...	...	...	...	15'00
Glycerin	...	...	...	...	35'00

Soften the gelatin by soaking in the water; then add the glycerin and zinc oxide, previously rubbed together to a smooth paste. Heat

the mixture on a water-bath, stirring until the gelatin is dissolved and a product of uniform consistence is obtained. Pour into a flat dish or tray to solidify.

When required for use, this paste is melted on a water-bath, and applied to the skin with a stiff brush; the part may then be covered with cotton wool or lint. It is a soothing application for eczema and other irritable conditions of the skin, and is especially valuable in the treatment of varicose ulcers.

### PASTA ZINCI ET ICHTHAMOLIS.

#### ZINC AND ICHTHAMOL PASTE.

*Synonyms.*—Zinc and Ammonium Ichthosulphonate Paste.

Zinc Oxide	...	...	...	...	10'00
Ammonium Ichthosulphonate	...	...	...	...	2'00
Gelatin	...	...	...	...	16'00
Glycerin	...	...	...	...	32'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Soften the gelatin by soaking in water, then add the glycerin, zinc oxide, and ammonium ichthosulphonate, previously rubbed together to a smooth paste. Heat on a water-bath till the gelatin is dissolved and the product is of uniform consistence. Pour into a flat dish to solidify.

This paste is used for the same purposes as Pasta Zinci et Gelatini.

### PASTILLI.

#### PASTILLES.

Pastilles consist of a basis of glyco-gelatin, with which, when melted on a water-bath, the active medicinal agent, in solution or suspension, is incorporated. If insoluble, the medicament should be rubbed with a little glycerin before mixing with the hot basis. The melted mixture should be poured into moulds of a suitable shape and size, or into a suitable tray to solidify and then cut into the required number of pastilles. In the following formulæ the quantities are given for one pastille:—

#### Pastillus Acetomorphinæ. ACETOMORPHINE PASTILLE.

Acetomorphine Hydrochloride... 3 milligrams ( $\frac{1}{20}$  grain).

#### Pastillus Acetomorphinæ Compositus. COMPOUND ACETOMORPHINE PASTILLE.

Acetomorphine Hydrochloride	2 milligrams	( $\frac{1}{32}$ grain).
Ammoniated Glycyrrhizin	20 milligrams	( $\frac{5}{16}$ grain).
Pine Oil...	1½ centimils	( $\frac{1}{4}$ minim).

#### Pastillus Acidi Borici. BORIC ACID PASTILLE.

Boric Acid ... 12 centigrams (2 grains).



**Pastillus Acidi Carbolici.** CARBOLIC ACID OR PHENOL PASTILLE.

Carbolic Acid ... 3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

**Pastillus Aconiti.** ACONITE PASTILLE.

Tincture of Aconite ... 6 centimils (1 minim).

**Pastillus Ammonii Bromidi.** AMMONIUM BROMIDE PASTILLE.

Ammonium Bromide... 6 centigrams (1 grain).

**Pastillus Ammonii Chloridi.** AMMONIUM CHLORIDE PASTILLE.

Ammonium Chloride ... 12 centigrams (2 grains).

**Pastillus Ammonii Chloridi Compositus.** COMPOUND AMMONIUM CHLORIDE PASTILLE.

Ammonium Chloride ... 12 centigrams (2 grains).

Liquid Extract of Liquorice ... 12 centimils (2 minims).

**Pastillus Apomorphinæ et Codeinæ.** APOMORPHINE AND CODEINE PASTILLE.

Apomorphine Hydrochloride ... 2 milligrams ( $\frac{1}{32}$  grain).

Codeine ... 6 milligrams ( $\frac{1}{10}$  grain).

**Pastillus Betacainæ.** BETACAINE PASTILLE.

Betacaine Lactate ... 6 milligrams ( $\frac{1}{10}$  grain).

**Pastillus Bismuthi.** BISMUTH PASTILLE.

Bismuth Carbonate ... 2 decigrams (3 grains).

**Pastillus Bismuthi et Morphinæ.** BISMUTH AND MORPHINE PASTILLE.

Bismuth Carbonate ... 2 decigrams (3 grains).

Morphine Acetate ...  $1\frac{1}{2}$  milligrams ( $\frac{1}{40}$  grain).

**Pastillus Boracis.** BORAX PASTILLE.

Borax ... 2 decigrams (3 grains).

**Pastillus Cascaræ Sagradæ.** CASCARA SAGRADA PASTILLE.

Extract of Cascara Sagrada ... 12 centigrams (2 grains).

**Pastillus Cocainæ.** COCAINE PASTILLE.

Cocaine Hydrochloride ... 3, 5, 6, 8 or 10 milligrams ( $\frac{1}{20}$ ,  $\frac{1}{12}$ ,  $\frac{1}{10}$ ,  $\frac{1}{8}$ , or  $\frac{1}{6}$  grain).

**Pastillus Cocainæ et Morphinæ.** COCAINE AND MORPHINE PASTILLE  
*Synonym.*—Pastillus Tussis.

Cocaine ... 4 milligrams ( $\frac{1}{15}$  grain).

Morphine Hydrochloride ... 2 milligrams ( $\frac{1}{30}$  grain).

**Pastillus Codeinæ.** CODEINE PASTILLE.

Codeine ... 8 milligrams ( $\frac{1}{8}$  grain).

**Pastillus Eucalyptolis.** EUCALYPTOL PASTILLE.

Eucalyptol	...	...	...	3 centimils	( $\frac{1}{2}$ minim).
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**Pastillus Eucalyptolis et Cocainæ.** EUCALYPTOL AND COCAINE PASTILLE.

Eucalyptol	...	...	...	3 centimils	( $\frac{1}{2}$ minim).
Cocaine Hydrochloride	...	...	...	3 milligrams	( $\frac{1}{20}$ grain).

**Pastillus Iodoformi.** IODOFORM PASTILLE.

Iodoform	...	...	...	6 centigrams	(1 grain).
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**Pastillus Mentholis.** MENTHOL PASTILLE.

Menthol...	...	...	...	3 to 6 milligrams	( $\frac{1}{20}$ to $\frac{1}{10}$ grain).
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**Pastillus Mentholis et Cocainæ.** MENTHOL AND COCAINE PASTILLE.

Menthol...	...	...	...	3 milligrams	( $\frac{1}{20}$ grain).
Cocaine Hydrochloride	...	...	...	3 milligrams	( $\frac{1}{20}$ grain).

**Pastillus Mentholis et Codeinæ.** MENTHOL AND CODEINE PASTILLE.

Menthol...	...	...	...	3 milligrams	( $\frac{1}{20}$ grain).
Codeine...	...	...	...	6 milligrams	( $\frac{1}{10}$ grain).

**Pastillus Mentholis et Eucalyptolis.** MENTHOL AND EUCALYPTOL PASTILLE.

Menthol...	...	...	...	3 milligrams	( $\frac{1}{20}$ grain).
Eucalyptol	...	...	...	3 centimils	( $\frac{1}{2}$ minim).

**Pastillus Morphinæ.** MORPHINE PASTILLE.

Morphine Acetate	...	...	...	2 milligrams	( $\frac{1}{30}$ grain).
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**Pastillus Pepsinæ.** PEPSIN PASTILLE.

Pepsin	...	...	...	...	2 decigrams (3 grains).
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**Pastillus Pini et Terpini et Acetomorphinæ.** PINE, TERPIN, AND ACETOMORPHINE PASTILLE.

Pine Oil	...	...	...	3 centimils	( $\frac{1}{2}$ minim).
Terpin Hydrate	...	...	...	8 milligrams	( $\frac{1}{8}$ grain).
Acetomorphine Hydrochloride	...	...	...	1 $\frac{1}{2}$ milligrams	( $\frac{1}{15}$ grain).

**Pastillus Sulphuris Compositus.** COMPOUND SULPHUR PASTILLE.

Precipitated Sulphur	...	...	...	3 decigrams	(5 grains).
Acid Potassium Tartrate	...	...	...	6 centigrams	(1 grain).

**Pastillus Terebeni.** TEREbene PASTILLE.

Terebene	...	...	...	12 centimils	(2 minims).
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**Pastillus Terpini et Acetomorphinæ et Mentholis.** TERPIN, ACETOMORPHINE, AND MENTHOL PASTILLE.

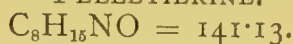
Terpin Hydrate	...	...	15	or 60 milligrams ( $\frac{1}{4}$ or 1 grain)
Acetomorphine Hydrochloride			$\frac{1}{8}$ or $\frac{2}{3}$	milligram ( $\frac{1}{400}$ or $\frac{1}{100}$ grain)
Menthol...	...	...	$1\frac{1}{2}$	or 6 milligrams ( $\frac{1}{40}$ or $\frac{1}{10}$ grain)

**Pastillus Thymolis.** THYMOL PASTILLE.

Thymol...	...	...	2	milligrams ( $\frac{1}{32}$ grain).
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**PELLETIERINA.**

PELLETIERINE.

*Synonym.*—Punicine.

Pelletierine,  $\text{C}_8\text{H}_{15}\text{NO}$ , is a liquid alkaloid obtained from the root bark of *Punica Granatum*, Linn. (N.O. Lythraceæ), a shrub or small tree indigenous to North-Western India, and cultivated in subtropical regions generally. It may be extracted from the powdered bark by treating with chloroform and milk of lime, decanting the chloroform, and shaking it with diluted acid. The acid solution is made alkaline with solution of sodium hydroxide, and shaken with chloroform. From the alkaloids obtained, the pelletierine is separated by distillation in a current of hydrogen.

It occurs as a colourless, volatile, oily liquid having a peculiar aromatic odour resembling that of wine, and becoming brown on exposure to the air. It is dextro-rotatory, whilst its salts are lævo-rotatory, and is only slightly poisonous. Soluble in cold water (1 in 23), in all proportions of alcohol, ether, and chloroform. The aqueous solution has a strongly alkaline reaction. Specific gravity, 0.988; boiling-point,  $195^\circ$ , with partial decomposition; but it may be distilled *in vacuo*. By heating to  $100^\circ$  it becomes optically inactive. The base absorbs oxygen from the air energetically, thereby resinifying and becoming dark in colour. In contact with hydrochloric acid vapours it forms a cloud, and with acids forms well-defined crystalline salts. The solutions of its salts are precipitated by most alkaloidal reagents, but not by platinic chloride. With cobalt or copper sulphate it gives a blue precipitate. The tannic acid precipitate is soluble in excess of the reagent. Concentrated sulphuric acid with potassium bichromate gives a green colouration. It should be protected from light and from acid vapours.

Pelletierine of commerce consists of true pelletierine and isopelletierine (isopunicine), the two constituents of the bark to which its anthelmintic properties are due. Isopelletierine has the same empirical formula as pelletierine, and the same boiling-point, solubility, and other properties; but it is optically inactive, and its sulphate is deliquescent, pelletierine sulphate being non-deliquescent.

Pelletierine has a specific action on tape worm, and its preparations are used on this account as anthelmintics. Immersed in a 1 in



10000 solution of pelletierine, the parasite loses its power of movement in about six minutes, but will recover if it is then removed from the solution; it is, however, killed by ten minutes' immersion in the solution. Other intestinal worms are less susceptible to the action of pelletierine. It is usually given internally as pelletierine tannate, but the sulphate, hydrochloride, and hydrobromide are also prepared, and given in doses of 3 to 5 decigrams (5 to 8 grains). The administration of large doses causes giddiness, confusion, and great weakness in the legs.

*Dose.*—2 to 4 decigrams (3 to 6 grains).

### PELLETIERINÆ TANNAS.

PELLETIERINE TANNATE.

*Synonym.*—Punicine Tannate.

Pelletierine tannate is a salt of the alkaloid pelletierine, and may be prepared by precipitating an aqueous solution of 1 part of pelletierine sulphate with an aqueous solution of 3·3 parts of tannic acid, previously neutralised by means of solution of ammonia. The precipitate thus obtained is washed, dried at a gentle heat, and powdered. Commercially, however, pelletierine tannate is usually a mixture in varying proportions of the tannates of the four alkaloids obtained from the root-bark of *Punica Granatum*, Linn., and is prepared by mixing the ground bark with milk of lime, percolating with water, shaking the percolate with chloroform, and shaking the chloroformic solution with diluted sulphuric acid. To the neutralised solution of the mixed sulphates thus obtained a solution of tannic acid is added, when the sparingly soluble tannates are thrown out and subsequently dried at a gentle heat.

It occurs as a light yellow or greyish-white amorphous powder, odourless, having an astringent taste and a weak acid reaction. Soluble in water (about 1 in 700), in alcohol (1 in 80); in warm diluted acids; insoluble in chloroform. It contains about 7 per cent. of moisture, which may or may not be water of crystallisation, but corresponds to two molecules of water. Dried over sulphuric acid and heated it turns brown at 150°, softens at about 165°, and when heated to a higher temperature decomposes and chars without melting; on ignition with free access of air it burns without leaving any residue. The aqueous solution is coloured blue-black by solution of ferric chloride, and forms white precipitates with solutions of lead, mercury, and zinc salts; platinic chloride, however, gives no precipitate. Solution of ammonia gives a white precipitate soluble in excess, forming a yellowish-red solution. The aqueous solution immediately reduces silver nitrate and gold chloride solutions to the metallic state, the former as a black precipitate and the latter as a thin purplish mirror in the test-tube. Sulphuric acid gives a yellow colour, the liquid on being heated turning slowly to green and finally to purple. Nitric acid gives no colouration. Sulphuric acid, with a trace of selenious acid, produces a light bluish-green colour, gradually becoming dark green and developing a pink border. If a

hydrochloric acid solution be shaken with excess of sodium hydroxide solution and ether, the ether separated leaves, after evaporating spontaneously, slightly yellowish oily drops, having a peculiar odour, strongly alkaline reaction, and producing fumes when brought in contact with the vapour of hydrochloric acid.

Pelletierine tannate has the properties of pelletierine, but is preferred to the pure alkaloid and its sulphate on account of its greater insolubility in the stomach, with a consequent decreased tendency to absorption, the occurrence of which may give rise to symptoms of intoxication resembling those caused by male-fern. The dose may be given suspended in water. It should be administered on an empty stomach, and followed after one to two hours by a brisk purge.

*Dose.*—3 to 5 decigrams (5 to 8 grains).

*NOTE.*—Pelletierine de Tanret is said to be a mixture of pelletierine and tannic acid.

## PEPSINUM.

### PEPSIN.

Pepsin is an enzyme or soluble ferment obtained from the mucous lining of the fresh and healthy stomach of the pig, *Sus scrofa*, Linn., sheep, *Ovis aries*, Linn., or calf, *Bos taurus*, Linn. (Order Ungulata). It is a proteid-like body formed from the zymogen pepsinogen, which is secreted by glands imbedded in the tissue of the inner coating of the stomach. It may be obtained by scraping the mucous membrane, drying and powdering the viscid pulp, or preferably by removing the mucous membrane from the underlying muscular coats, mincing it finely and allowing it to macerate for several days in water slightly acidified with hydrochloric acid or mixed with glycerin. The pepsin is precipitated from the aqueous liquid, after filtering the latter from undigested debris, by saturating the solution with sodium chloride, ammonium sulphate, or some other neutral salt. It may be freed from excess of salt by suspending it in water in a dialyser, the adhering salt diffusing away while the pepsin remains in the dialyser. The pepsin is reprecipitated from the aqueous solution on the addition of excess of alcohol, after which it is collected and dried at a low temperature, or the aqueous solution may be evaporated *in vacuo* and the residue powdered. Scale pepsin is prepared by allowing the finely divided inner coatings of the stomach to digest in a mixture of hydrochloric acid and water, straining when solution is complete and evaporating to a syrupy consistence at a temperature not exceeding 45°, after which dextrin is added and the strained syrupy fluid spread in thin layers on glass plates, and allowed to evaporate in an atmosphere free from dust and then scaled off. Granular pepsin is prepared in the same way, but without any addition of dextrin, and the syrupy fluid evaporated so as to produce thicker sheets, which are broken up into small pieces when dry.

As it occurs in commerce, pepsin is a light yellowish-brown or white amorphous powder, or it forms pale yellow translucent scales or grains. No commercial pepsin is absolutely pure

but it should be free from any trace of putrescence, and have only a faint odour and slightly saline taste, afterwards bitterish; it is liable to absorb moisture from the air, the amount of peptone usually present determining this quality. The presence of mucus tends to develop an unpleasant odour, and it also affects the solubility in water. Soluble, or almost entirely soluble, in water (about 1 in 50), forming a more or less opalescent solution, more soluble in water acidified with hydrochloric acid; insoluble in alcohol, ether, or chloroform. There are three distinct types of pepsin in commerce:—1. That which is insoluble in water without the aid of traces of acid. 2. That which is soluble in water forming clear or slightly opalescent solutions. 3. That which is not entirely soluble in water or in diluted hydrochloric acid. The insoluble pepsins are said to be less liable to deteriorate on keeping; the soluble kind are more hygroscopic, but better suited for making liquid preparations. Pepsin should form with distilled water an almost clear solution, which is not rendered turbid by the addition of acetic acid (absence of mucus). It should give no reaction for starch. Sodium chloride in more than minute quantities impairs the activity of pepsin, and so also does alcohol; glycerin, however, has neither destructive nor inhibitive action, and is used as a preservative for solutions. Pepsin in solution is incompatible with alkalies or their carbonates, tannic or gallic acids, and in the presence of more than 0.5 per cent. of real hydrochloric acid its proteolytic activity is inhibited and eventually destroyed. Its proteolytic power in solution is destroyed at temperatures above 70°. In the dry state, however, it is not injured at higher temperatures than this.

The chief constituent of pepsin is a soluble enzyme, which renders insoluble proteins soluble, converting them into proteoses and peptones. It can be prepared in a relatively pure state by extracting the finely divided mucous membrane with water containing 5 per cent. of phosphoric acid, straining off the debris, filtering the extract, and adding lime water almost to the point of neutralisation, the calcium phosphate thus precipitated carrying down with it most of the enzyme, mixed with a certain amount of proteid matter. The precipitate is dissolved in dilute hydrochloric acid, and lime water again added to cause precipitation, the enzyme clinging to the precipitate being thus obtained much purer than before, after which the precipitate is again dissolved in dilute hydrochloric acid, and subjected to dialysis until the solution is free from chlorides and phosphates. Or, a solution of cholesterin in alcohol and ether is passed through a thistle funnel reaching to the bottom of the vessel containing the acid solution of pepsin; the cholesterin, being insoluble in and lighter than water, rises to the surface, carrying with it the enzyme, and, after the separated matter has been washed with very dilute acetic acid, and subsequently suspended in a little water, the cholesterin can be removed by repeated agitation with ether, leaving the purified enzyme dissolved in the water, from which it can be separated by evaporating the liquid.



The digestive or solvent action of pepsin on protein substances only occurs in acid solution, 0·4 per cent. of real hydrochloric acid being about the optimum strength. It dissolves natural insoluble proteins, albumen, and fibrin, converting them first into soluble acid albumose, and subsequently into peptone, the peptonising power being the quality on which the valuation of the pepsin depends; mere solution of coagulated albumen does not necessarily imply peptonising power. It is officially required that pepsin should dissolve 2500 times its weight of coagulated albumen. The albumen for testing should be prepared by boiling fresh eggs in water for fifteen minutes, then placing in cold water so that they may cool sufficiently to be easily handled. The whites are then separated, washed, and freed from all traces of membrane and yolk, superfluous moisture wiped off with a clean cloth, and at once rubbed through wire gauze having twelve meshes to a centimetre. If 12·5 grammes of the albumen be digested with 125 mls of acidulated water—prepared by mixing 1 gramme of hydrochloric acid (specific gravity, 1·160) with 156 mls of water, and containing 0·2 per cent. of hydrogen chloride—and 5 milligrams of pepsin for six hours at a temperature of 40·5°, the mixture being shaken frequently, the albumen should dissolve, leaving only a few small flakes in an almost clear solution. Pepsin is used in therapeutics to increase the digestive power of the gastric juice when there is a deficiency of ferment. This is known to occur in the aged who suffer from chronic wasting diseases; there is reason to believe, however, that inactivity of the gastric secretion is more often due to deficiency of acid rather than to deficiency of ferment, especially in cancer. Pepsin is given in a number of forms of dyspepsia, usually with dilute hydrochloric acid; Glycerinum Pepsini is a rational form of administration. It may also be dispensed in pills, massed with syrup of glucose, or in powders or cachets.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTE.—Pepsin can be obtained in commerce of such strength that it is capable of dissolving from 3000 to 5000 times its weight of coagulated albumen.

## PEPTONUM.

### PEPTONE.

Peptone is a product of the digestion of albuminoid substances. The soluble enzyme of pepsin renders insoluble proteids soluble, converting them into proteoses and peptones; pancreatic digestion likewise results in the formation of peptones. It may be prepared by artificial digestion as follows:—Mince 1000 of lean beef, freed from bone, etc., and mix it with 4000 of water; to this add a solution of 5 of pepsin in 1000 of water, acidified with 50 of 25 per cent. hydrochloric acid. The mixture thus prepared is kept at a temperature not exceeding 50° until 10 mls of the filtrate on the addition of 15 decimils of nitric acid in the cold no longer gives

a precipitate. Formation of a coagulum indicates incomplete peptonisation. The solution is then filtered, neutralised with sodium bicarbonate, and evaporated to dryness *in vacuo*. It may be purified, if necessary, from adherent sodium chloride by dialysis, or by precipitation by alcohol, washing with ether, and drying. By desiccating its concentrated solution upon oiled plates, peptone may be obtained in scales.

It occurs as a white or yellowish-brown amorphous powder, or in scales, with a somewhat cheesy but not unpleasant taste, and nearly odourless. The pure substance when added to water hisses and froths, at the same time evolving heat. Soluble in water (1 in 2), forming a neutral, or very slightly acid, but not gelatinous solution. Aqueous solutions are pale yellow and clear, or may be made quite clear by the addition of a little hydrochloric acid. The addition of alcohol precipitates the peptone. Aqueous solutions are not coagulated by boiling. No precipitate is formed in aqueous solutions on the addition of nitric or other acid, or potassium ferrocyanide (distinction from albumen), nor is precipitation caused by solution of ferric chloride or cupric sulphate, nor by saturation with ammonium sulphate or zinc sulphate (distinction from albumoses). The solutions are lævo-rotatory. Neutral solutions are precipitated by tannin and by various salts of mercury. Acid solutions give precipitates with bismuth-potassium iodide, potassium mercuric iodide, bromine water, and other alkaloidal reagents, but these precipitates are soluble in excess of the precipitants. Peptone is coloured yellow by nitric acid, and gives with Millon's reagent on warming a red colour and precipitate, and with cupric sulphate and caustic alkali a violet-red colour (biuret reaction). Picric acid gives yellow flakes. Peptone should not be precipitated by lead acetate, alum, or hydrogen sulphide. On ignition it should not yield more than 2 per cent. of ash.

Peptone is given as a nutrient in the form of pastilles, 5 grains in each, prepared with gelatin. It is administered in rectal alimentation in the form of suppositories (see *Suppositoria Nutrients*), or it may be added to rectal enemata. It is a constituent of some bacterial culture media, and a clear solution of peptone, 3, acetic acid, 3, salicylic acid, 0.4, and distilled water, 350, is used as a test for bile in urine; 1 part of urine containing bile salts added to 3 parts of this solution causes an opalescence proportionate to the amount of bile constituents present.

NOTES.—Commercially the name peptone is applied to various substances obtained by the action of ferments on meat; beef peptone occurs as a brown extract, with an odour and taste resembling those of meat extract (see *Peptonum Bovinum*). Solutions of the peptonised albuminoids of milk, bread, and meat are prepared for use as nutritives. Under the name Somatose, preparations are supplied which consist principally of albumose of meat or milk (Milk Somatose), or albumose with 4.5 per cent. of ferric oxide (Iron Somatose). These are employed as nutrients in wasting diseases—the last in chlorosis and anæmia—in doses of 5 to 10 grammes daily.

**PEPTONUM BOVINUM.**

BEEF PEPTONE.

*Synonym.*—Peptone Paste.

Beef peptone is a paste obtained by the digestive action of pepsin on beef macerated in water acidulated with hydrochloric acid (see Peptonum).

It occurs as a chocolate-brown paste which resembles extract of beef in odour, and has an unpleasantly bitter taste. The paste contains a variable amount of water, and is therefore of uncertain strength.

Beef peptone possesses nutritive properties, and is sometimes added to beef tea. It is also used in the preparation of nutrient enemata and suppositories.

**PERSIO.**

CUDBEAR.

Cudbear is a purplish-red powder obtained from *Rocella tinctoria*, DC., *R. Montagnei*, Bel., and other species (N.O. Discomycetes), lichens growing chiefly on the Canary Islands, Madagascar, and on the African coasts. The lichens are boiled with water containing chalk in suspension, and the liquor obtained concentrated in a vacuum to a specific gravity of about 1.06. The residue of lichen is dried, freed from mechanical impurities, and introduced into large vats. About twice the weight of concentrated liquor and about one-sixth of solution of ammonia are then added and the whole kept at a temperature of 25° to 30° for two or three months with occasional stirring. The mass is then dried and powdered (see also under Litmus).

It occurs as a purplish-red powder, which imparts a rich red colour to acid and neutral liquids; the colour is changed to purplish-red on the addition of alkalis.

Cudbear is employed as a colouring agent, especially in the preparation of syrups having an acid reaction.

**PESSI.**

PESSARIES.

Pessaries are made by incorporating melted oil of theobroma or gelato-glycerin with the requisite quantity of active ingredient, reduced if necessary to very fine powder, and pouring the mixture into moulds capable of holding 8 grammes (120 grains). Pessaries of the following substances are often used, the quantities for one pessary being given in each case. Unless otherwise ordered, hydrastis and ichthamol pessaries should be made with gelato-glycerin, the rest with oil of theobroma:—

**Pessus Acidi Borici.** BORIC ACID PESSARY.

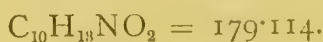
Boric Acid	...	...	...	6 decigrams (10 grains).
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- Pessus Acidi Carbolici.** CARBOLIC ACID OR PHENOL PESSARY.  
 Carbolic Acid ... .. 12 centigrams (2 grains).
- Pessus Acidi Tannici.** TANNIC ACID PESSARY.  
 Tannic Acid ... .. 6 decigrams (10 grains).
- Pessus Aluminis.** ALUM PESSARY.  
 Alum ... .. 1 gramme (15 grains).
- Pessus Aluminis et Zinci.** ALUM AND ZINC PESSARY.  
 Alum ... .. 3 decigrams (5 grains).  
 Zinc Sulphate ... .. 3 decigrams (5 grains).
- Pessus Belladonnæ.** BELLADONNA PESSARY.  
 Alcoholic Extract of Belladonna... 12 centigrams (2 grains).
- Pessus Cocainæ.** COCAINE PESSARY.  
 Cocaine Hydrochloride 3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).
- Pessus Coniinæ.** CONIINE PESSARY.  
 Coniine Hydrobromide ... .. 3 centimils ( $\frac{1}{2}$  minim).
- Pessus Hydrargyri.** MERCURY PESSARY.  
 Mercury Ointment ... .. 2 grammes (30 grains).
- Pessus Hydrastis.** HYDRASTIS PESSARY.  
 Liquid Extract of Hydrastis ... 8 decimils (12 minims).
- Pessus Ichthamolis.** ICHTHAMOL PESSARY.  
 Ammonium Ichthosulphonate ... 5 and 10 per cent.
- Pessus Iodoformi.** IODOFORM PESSARY.  
 Iodoform ... .. 3 decigrams (5 grains).
- Pessus Plumbi Iodidi.** LEAD IODIDE PESSARY.  
 Lead Iodide ... .. 3 decigrams (5 grains).
- Pessus Quininæ.** QUININE PESSARY.  
 Quinine Hydrochloride ... 2 to 3 decigrams (3 to 5 grains).
- Pessus Zinci Oxidi.** ZINC OXIDE PESSARY.  
 Zinc Oxide ... .. 1 gramme (15 grains).

## PHENACETINUM.

### PHENACETIN.



*Synonyms.*—Acetphenetidin; Acet-paraphenetidin; Para-acetphenetidin.

Phenacetin,  $\text{C}_2\text{H}_5\text{OC}_6\text{H}_4\text{NHCOCH}_3$ , is prepared by the action of slightly diluted nitric acid, or a mixture of sulphuric acid and solution of sodium nitrate, on melted phenol; ortho- and para-nitrophenols

are formed. As the para-nitrophenol is not volatile the two varieties are separated by distillation with steam, the residual para-compound being afterwards decolourised with animal charcoal, and crystallised. By the action of sodium hydroxide, sodium nitrophenol is formed, and this is heated with ethyl iodide and converted into para-nitrophenetol; this latter compound by the action of nascent hydrogen is converted into para-amidophenetol or paraphenetidin, which finally, by prolonged boiling with glacial acetic acid, is converted into para-acetphenetidin or phenacetin.

It occurs in white glistening laminar crystals, or as a crystalline powder, odourless, and almost tasteless. Soluble in cold water (1 in 1700), in boiling water (1 in 50), in alcohol (1 in 21), in 60 per cent. alcohol (1 in 100), slightly soluble in glycerin, insoluble in acid or alkaline solutions. The solutions are neutral. Melting-point,  $135^{\circ}$ , but this figure is rather high for the commercial article; it applies to the chemically pure or water-free product. At a higher temperature it burns, and on complete ignition leaves no weighable residue. Admixture with acetanilide lowers the melting-point considerably. It dissolves in sulphuric acid without colour, but if shaken with nitric acid is coloured yellow, which colour persists when heated. If 1 decigram be boiled with 10 mils of water it should yield a solution, which when cooled and filtered should not become turbid on the addition of solution of bromine in slight excess (absence of acetanilide). If 1 decigram be boiled for one minute with 3 mils of solution of sodium hydroxide (1 in 2), the solution cooled, and then agitated with 5 mils of a solution of chlorinated soda, there should be produced a clear yellow liquid, and not a purplish-red or brownish-red, cloudy liquid or precipitate (absence of acetanilide). A mixture of 3 decigrams with 1 mil of alcohol should not acquire a red tint when diluted with three times its volume of water, and boiled with  $\frac{1}{2}$  decimil of decinormal solution of iodine (absence of paraphenetidin). If  $2\frac{1}{2}$  grammes of chloral hydrate be melted on a water-bath,  $\frac{1}{2}$  gramme of phenacetin added, and the whole shaken together, solution occurs, and the liquid, in the presence of only traces of paraphenetidin, is coloured immediately violet, reddish, or bluish in tint, according to the proportion of impurity present. On boiling 1 decigram of phenacetin with 2 mils of hydrochloric acid for five minutes, diluting with ten times its volume of water, and cooling, the solution assumes a deep red or ruby colouration on the addition of 1.5 decimil of 3 per cent. solution of chromic acid (distinguishing phenacetin from acetanilide and methyl acetanilide).

Phenacetin is oxidised in the system, with formation of para-amidophenol. This decomposition takes place more slowly than with acetanilide, so that toxic effects due to a rapid distribution of para-amidophenol through the tissues with consequent alteration of the red blood corpuscles and production of methæmoglobin are less often observed. Phenacetin reduces temperature in fever by its action on the heat-regulating mechanism of the central nervous system; its

effect is to increase the loss of heat by dilatation of the cutaneous vessels. Phenacetin depresses the nerve centres, producing a diminished sensibility to pain. It is on this account largely employed to relieve headache, rheumatic, and neuralgic pains. It is usually well tolerated, but large doses may cause sweating; cyanosis and the rash that sometimes follow the administration of acetanilide are rarely observed with phenacetin. It is best administered in cachets or suspended in water with compound tragacanth powder. It is commonly prescribed with caffeine, which counteracts the tendency to circulatory depression; the combination is said to be useful in migraine. It is conveniently given as Phenacetinum Effervescens, or as Phenacetinum cum Caffeina Effervescens, *which may be made in same way as corresponding preps. of antipyrine but should contain only 5% of phenacetin.*

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTES.—A sample of phenacetin complying with all the official tests but that of the melting-point has caused death. The melting-point was found to be  $120^{\circ}$  instead of  $135^{\circ}$ , and examination showed the presence of about 6 per cent. of chlorine in organic combination, due to an unsuspected impurity, viz., parachloroacetanilide. The following substitutes for phenacetin have been introduced into medicine, but their action differs in no important particular from that of phenacetin: para-phenetidin amygdalate (Amygdophenin), para-phenetidin citrate (Citrophen), para-phenetidin-methylglycollate (Kryofin), para-phenetidin lactate (Lactophenin), para-phenetidin salicylate (Malakin).

## PHENAZONUM.

### PHENAZONE.

Phenazone, or phenyl-dimethyl-iso-pyrazolone, is better known as antipyrine, under which name it therefore is described (see Antipyrina). It appears desirable that the name phenazone should no longer be associated with this compound, inasmuch as it has also been applied to diphenylenazone, a substance of entirely different character.

## PHENOCOLLI HYDROCHLORIDUM.

### PHENOCOLL HYDROCHLORIDE.



*Synonyms.*—Amido-acetparaphenetidin Hydrochloride; Phenamine; Glycocoll-paraphenetidin Hydrochloride.

Phenocoll hydrochloride,  $\text{C}_6\text{H}_4\text{OC}_2\text{H}_5\text{NHCOCH}_2\text{NH}_2\text{HCl}$ , may be prepared by the action of chloracetyl-chloride on phenetidin and subsequent treatment of the resulting ethoxymonochloroacetanilide with ammonia; the basic compound thus formed—amido-acetparaphenetidin or phenocoll—is neutralised with hydrochloric acid to form the salt.

It occurs in the form of white crystalline needles or cubes, or as a white microcrystalline powder, having a sharp, saline, and slightly bitter taste. Soluble in cold water (1 in 16), easily in hot water,



soluble in alcohol. The aqueous solution is neutral to litmus. On ignition no permanent residue should remain. The aqueous solution on treatment with ammonia, fixed alkalies or their carbonates, liberates the base phenocoll in the form of pure white felted crystals melting at  $95^{\circ}$  (colouration indicates impurity). Ferric chloride should not cause a red colouration in the aqueous solution either in the cold or on warming (absence of parphenetidin). A 5 per cent. aqueous solution boiled with a few drops of nitric acid gives a yellow-red colouration. It is stated that, on heating the aqueous solution with alkali and a few drops of chloroform, a disagreeable odour of isonitrile is developed. An aqueous solution heated with a few drops of sodium carbonate solution to  $60^{\circ}$  should give off no ammoniacal odour (absence of ammonium salts). Half a gramme should make a perfectly clear solution with 15 mls of water (absence of di- and tri-phenocoll).

Phenocoll hydrochloride reduces temperature in fever, its action closely resembling that of phenacetin, but it is more rapid in its effects on account of its greater solubility. It is employed chiefly in rheumatic fever, acute rheumatism, malaria, and in epidemic influenza. In combination with piperazine, it has been recommended for rheumatoid arthritis. Phenocoll hydrochloride may be given in mixtures or dispensed in cachets.

*Dose.*— $\frac{1}{2}$  to 1 gramme (7 to 15 grains).

*NOTES.*—Phenocoll salicylate (Salocoll) is less soluble in water than the hydrochloride, and is employed as an anti-neuralgic and anti-rheumatic, in doses of 6 to 20 decigrams (10 to 30 grains).

## PHENOL CUM CAMPHORA.

### PHENOL WITH CAMPHOR.

*Synonyms.*—Phenol Camphor; Carbolic Camphor.

Carbolic Acid	...	...	...	...	...	25.00
Camphor...	...	...	...	...	...	75.00

Mix to form a liquid. The product is soluble in alcohol, ether, chloroform and oils, but insoluble in water and in glycerin.

Phenol camphor is used as a local anæsthetic in toothache. It is also employed to touch acne spots and boils, and as a paint to the cervix uteri.

## PHENOL IODATUM.

### IODISED PHENOL.

*Synonym.*—Iodised Carbolic Acid.

Iodine	...	...	...	...	...	10.00
Liquefied Carbolic Acid, sufficient to produce						100.00

Dissolve the iodine in the liquefied carbolic Acid.

Iodised phenol is used to swab out the uterus in chronic endometritis, etc.; it is diluted with 160 times its volume (1 fluid drachm to 1 pint) to form an antiseptic vaginal douche for use in midwifery.

**PHENOLPHTHALEINUM.**

PHENOL-PHTHALEIN.



*Synonyms.*—Dihydroxy-diphenyl-phthalide; Dihydroxy-phthalophenone.

Phenol-phthalein may be prepared by heating 10 of phenol with 5 of phthalic anhydride and 4 of strong sulphuric acid to a temperature of 120° for ten or twelve hours, exhausting the product with boiling water, dissolving the residue in diluted sodium hydroxide solution, filtering, and precipitating with acetic acid. It may be purified by boiling the alcoholic solution with animal charcoal and precipitating the filtrate with water, when it separates as an amorphous powder which becomes crystalline if heated.

It occurs as a white, or pale yellowish-white, crystalline or amorphous powder; odourless. Very slightly soluble in water (1 in 600), but readily soluble in alcohol (1 in 10). Melting-point, 250° to 253°. It burns without leaving any residue. Alcoholic solutions are colourless, but the addition of an alkaline solution produces a magnificent pink colouration, which is discharged by the slightest excess of acid, inorganic or organic, and even by carbon dioxide. With ammoniacal solutions the pink colour is not permanent, but disappears on standing. Aniline does not give any colouration; silver nitrate gives a violet precipitate. The pink colouration produced by fixed alkalis is caused by the formation of an alkali salt of phenol-phthalein. The reaction being extremely delicate, phenol-phthalein is employed as an indicator in volumetric analysis, and may be used either with hot or cold liquids. For this purpose a 1 per cent. solution in alcohol is most suitable. It is not used as an indicator in the case of ammonia for the reason stated above. Commercial phenol-phthalein frequently contains considerable quantities of resinous bodies formed during the manufacture; these interfere with its sensitiveness as an indicator as well as with its medicinal action. If 5 decimils of a 1 per cent. solution in 50 per cent. alcohol be added to 250 mils of recently boiled and cooled distilled water, not more than 1 decimil of decinormal solution of sodium hydroxide should be required to produce a red colouration.

Pure phenol-phthalein is given internally for its purgative action. It produces loose motions in from four to six hours, is not usually absorbed in appreciable amounts, and does not irritate the kidneys or intestines. Absorption has, however, occurred sometimes, with resulting irritation of the kidneys and severe back-ache. The powder is best given in cachets; compressed tablets are not readily soluble. Children require about 45 milligrams ( $\frac{3}{4}$  grain); adults 12 to 18 centigrams (2 to 3 grains); but to adult patients confined to bed doses of 4 to 5 decigrams (6 to 8 grains) may be given.

*Dose.*— $\frac{1}{2}$  to 5 decigrams (1 to 8 grains).

*NOTES.*—Phenol-phthalein, in a simple or compounded form, is also known under the following trade-names:—Laxans, Laxatin, Laxatol, Laxatoline, Laxiconfect, Laxoin, Laxophen, Paraphthalein, Probilin, Purgella, Purgen,

Purgo, Purgolade, Purgylum, etc. Solution of phenol-phthalein, for use as an indicator, is prepared by dissolving 0.2 of phenol-phthalein in 60 of alcohol and sufficient distilled water to produce 100 by volume.

### PHENYLHYDRAZINA.

PHENYLHYDRAZINE.



Phenylhydrazine,  $\text{C}_6\text{H}_5\text{NHNH}_2$ , may be prepared by dissolving 10 of aniline in 200 of strong hydrochloric acid, cooling the solution, and adding 7.5 of sodium nitrite dissolved in about 50 of water; to this liquid, which contains diazobenzene chloride, is added 45 of stannous chloride dissolved in an equal weight of hydrochloric acid. The mixture soon forms a white crystalline magma of phenylhydrazine hydrochloride, which is washed with a mixture of alcohol and ether, dissolved in a little water and decomposed by strong solution of potassium hydroxide, and extracted with ether. It may be purified by drying over pure potassium hydroxide or carbonate, and distilling, the portion passing over between  $225^\circ$  and  $235^\circ$  being collected.

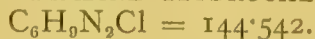
It occurs as a colourless, oily liquid, having a pleasant and faintly aromatic odour. On exposure to the air it becomes yellowish to reddish-brown by oxidation. Below  $17.5^\circ$  it solidifies in the form of thick, colourless, monoclinic plates. Boiling-point,  $241^\circ$ , with slight decomposition. Specific gravity, 1.091. Sparingly soluble in cold water, more soluble in hot water; readily soluble in alcohol and in ether. It is a monacid base, and forms well-defined, crystalline salts; it is also a strong reducing agent, absorbing oxygen from the air and becoming darker in colour. It reduces alkaline cupric solutions even in the cold, precipitating yellow cuprous hydrate and evolving nitrogen, while aniline and benzene are found in the solution. On adding mercuric oxide to an ethereal solution in the cold, nitrogen, aniline, benzene, and mercury diphenyl are formed. When heated with nascent hydrogen it yields aniline and ammonia. With water it forms a hydrate which melts at  $24^\circ$ .

Phenylhydrazine causes a considerable fall in the body temperature when taken internally, but this is so commonly accompanied by collapse and the formation of met-hæmoglobin as to prohibit the use of the substance in medicine. It is much used as a reagent for identifying aldehydes, ketones, etc., with which, in acetic acid solution, it forms both crystallisable and non-crystallisable condensation products known as phenylhydrazones. With glucose it forms a well-defined yellow crystalline compound known as glucosazone, which melts between  $204^\circ$  and  $205^\circ$ , and hence is used as a delicate test for sugar in urine (see under Phenylhydrazinæ Hydrochloridum). Corresponding osazones are formed with other sugars.

NOTE.—Phenylhydrazine should be protected from light and air.

### PHENYLHYDRAZINÆ HYDROCHLORIDUM.

PHENYLHYDRAZINE HYDROCHLORIDE.



Phenylhydrazine hydrochloride,  $\text{C}_6\text{H}_5\text{N}_2\text{H}_3\text{HCl}$ , may be obtained



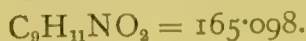
in a pure state by dissolving the base, freed from ammonia by distillation, in 10 parts of alcohol, treating with concentrated hydrochloric acid, and washing the separated crystals with a mixture of alcohol and ether until quite colourless.

It occurs in the form of small, thin, lustrous plates, easily soluble in water and in alcohol. It sublimes when cautiously heated. From its aqueous solution it is almost completely precipitated by concentrated hydrochloric acid, by which means phenylhydrazine can be separated from aniline and several other amido-bases. It reduces salts of silver, mercury, gold, and platinum in the cold. Distilled with zinc dust it is reduced to aniline and ammonia. Mixed with sodium acetate it forms a general test for aldehydes and ketones, with which it forms insoluble oily or crystalline compounds (hydrazones), thus precipitating them from their aqueous solutions; by warming these compounds with hydrochloric acid they are reconverted into their parent substances. When a solution of the salt, containing also sodium acetate, is heated with a solution of glucose, a yellow precipitate of needles of phenyl glucosazone forms. By this test sugar can be detected in the urine of diabetic patients when it is present in too small a quantity to give the ordinary tests. Proteids should be separated by heat before applying the test. As a test for formaldehyde it has been found to be very sensitive. Three mls of a solution containing 1 in 250000 of formaldehyde when heated with  $2\frac{1}{2}$  decimils of a 10 per cent. solution of phenylhydrazine hydrochloride (containing 15 per cent. of sodium acetate) and  $2\frac{1}{2}$  decimils of sulphuric acid gives a light green tint after three minutes and a decided colouration after ten minutes.

Phenylhydrazine hydrochloride should be handled with care, as it may produce an eczematous eruption of the skin. The best method of applying the phenylhydrazine test to detect small quantities of glucose is as follows:—To 50 mls of the suspected urine add 2 grammes of sodium acetate with 1 or 2 grammes of phenylhydrazine hydrochloride and heat the liquid to  $100^{\circ}$  C. for thirty minutes. In the presence of glucose, crystals of phenylglucosazone separate on cooling, and microscopical examination of the deposit shows the characteristic tufts of needles.

## PHENYLURETHANUM.

PHENYL-URETHANE.



*Synonyms.*—Carbanilic Ether; Ethyl-phenyl Carbamate.

Phenyl-urethane,  $\text{C}_6\text{H}_5(\text{NH})\text{CO}_2\text{C}_2\text{H}_5$ , structurally allied both to carbamic acid and to acetanilide, may be prepared by the interaction of aniline and ethyl chlor-formate, and purified by recrystallisation from diluted alcohol.

It occurs in the form of colourless needles or as a white crystalline powder, having a faint aromatic odour and slightly clove-like

and burning after-taste. Sparingly soluble in cold, more readily in hot water; soluble in alcohol, ether, and dilute alcoholic mixtures, such as wines. Melting-point,  $49^{\circ}$  to  $50^{\circ}$ . On ignition it burns without leaving any residue. It dissolves readily in cold sulphuric acid, forming a clear and colourless solution. Triturated with phenazone it forms a liquid mixture.

Phenyl-urethane has the same type of action as phenacetin, and it is converted in the body into para-amidophenol; it is more toxic than phenacetin, but is sometimes used as an analgesic in acute rheumatism, neuralgia, orchitis, and headache. It is antipyretic and antiseptic, and is given in tuberculosis; externally, it is used as a dusting powder, in skin diseases and syphilitic sores. Phenyl-urethane is best administered in cachets or in solution in weak alcohol. Large doses of 5 to 10 decigrams (8 to 15 grains) are sometimes given.

*Dose.*— $\frac{1}{2}$  to 5 decigrams (1 to 8 grains).

*NOTES.*—Phenyl-urethane is also known under the trade-name Euphorin. It should be protected from the light as much as possible.

## PHLORIDZINUM.

### PHLORIDZIN.



*Synonym.*—Phlorizin.

Phloridzin,  $\text{C}_{21}\text{H}_{24}\text{O}_{10}, 2\text{H}_2\text{O}$ , is a glucoside occurring in the bark, especially the root-bark, of the apple, pear, cherry, plum, and other rosaceous trees. It may be obtained by extracting the air-dried or fresh root-bark with 60 per cent. alcohol after digestion at about  $50^{\circ}$ . The extract is distilled and evaporated to remove alcohol; phloridzin separates from the residue when cold; it is then taken up with hot water, and treated with animal charcoal. From the filtrate it crystallises on cooling.

It occurs in the form of minute white or pinkish-white silky needles, or as a whitish or pale yellow light crystalline powder, odourless, and having a bitter but afterwards sweet taste. Sparingly soluble in cold water, but freely soluble in hot water, from which it crystallises on cooling; easily soluble in alcohol (1 in 4), sparingly soluble in ether. At  $100^{\circ}$  it loses its water of crystallisation, melts at  $107^{\circ}$ , solidifies again at  $130^{\circ}$ , and re-melts at  $170^{\circ}$ . At  $200^{\circ}$  it assumes a red colour, and changes to rufin. Boiled with diluted acids it is decomposed, yielding a sugar, phlorose, which is almost identical with dextrose, and phloretin, which, by the action of caustic alkalis, is split into phloroglucinol (a trihydric phenol), and phloretic acid, the acid of an aromatic alcohol. Exposed to the air in presence of ammonia it is converted into a fine purple colouring matter, phlorizein. Cold concentrated sulphuric acid dissolves it with a yellow colouration, which at  $25^{\circ}$  to  $50^{\circ}$  becomes red. On evaporating it with a few drops of a solution of vanillin in alcohol and a little hydrochloric acid a red colouration results. With solution

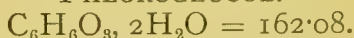
of ferric chloride a brown colouration is produced. It may be determined by the yield of sugar produced on hydrolysis with sulphuric acid.

Phloridzin is destructive to malarial parasites, and is used in physiological research to produce glycosuria in man or animals, this effect being produced by a direct action on the renal epithelium, which is rendered more permeable to sugar, but the resulting condition is altogether different from diabetes. It is administered hypodermically in aqueous solution, 5 milligrams in 1 mil of 1 in 200 solution of sodium carbonate, as a test of renal adequacy. In a healthy individual glucose appears in the urine in from fifteen to thirty minutes, and the glycosuria continues for from two to four hours. The total quantity of sugar eliminated is the important factor of the test, and this varies from 1 to 2 grammes in normal conditions. Phloridzin has been given internally as a tonic and anti-periodic in place of quinine; it has also been used as a diuretic, but is unsuitable for that purpose because of the severe loss of sugar it causes. It may be dispensed in pills massed with syrup of glucose, or suspended in mixture form with acacia or tragacanth.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

### PHLOROGLUCOL.

PHLOROGLUCOL.



*Synonyms.*—Phloroglucin; Phloroglucinol; Trioxybenzol; Trihydroxybenzene.

Phloroglucol,  $\text{C}_6\text{H}_3(\text{OH})_3, 2\text{H}_2\text{O}$ , is an isomer of pyrogallol, and was first prepared from the glucoside phloridzin, in which it exists in combination with phloretic acid and glucose; it results on fusing certain vegetable extracts, gum resins, quercitin, catechin, etc., with potassium hydroxide. It is prepared commercially by fusing 1 of resorcin with 6 of sodium hydroxide until the mass is of a chocolate colour, dissolving in water, acidifying with sulphuric acid, filtering, and shaking the filtrate with ether, which extracts the phloroglucol. The ether is distilled off, and the residue purified by sublimation, or crystallisation from an aqueous solution.

It occurs in the form of white or yellowish prismatic crystals or crystalline powder, having a sweet taste, efflorescent in dry air. Readily soluble in water, alcohol, and ether. At  $100^\circ$  it loses its water of crystallisation. If slowly heated it melts at  $210^\circ$ ; by rapidly heating, at  $217^\circ$ . At higher temperatures it sublimes without decomposition. The aqueous solution is coloured a deep violet-red by solution of ferric chloride, and is precipitated by solution of lead subacetate. It is a strong reducing agent, reducing Fehling's solution and ammoniacal silver nitrate. Its alkaline solutions are oxidised by exposure to the air, and become brown. When dissolved in ammonia it yields a crystalline base, phloramine.

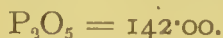
Phloroglucol gives a red colour with aromatic aldehydes in the presence of hydrochloric acid, and is thus used to show the presence



of such aldehydes or of free hydrochloric acid. As a test for free hydrochloric acid in the stomach contents, it is used in conjunction with vanillin, in the form of "phloroglucin solution," prepared by dissolving 2 of phloroglucin and 1 of vanillin in 30 by weight of alcohol. A bright red colouration is formed in presence of hydrochloric acid on warming the sample with a few drops of the solution. A solution of phloroglucin in hydrochloric acid forms a characteristic test for lignin or woody tissue, which it colours an intense carmine-red; on this account it is much used as a microscopic reagent. The test may be roughly shown by moistening a freshly cut piece of pine, or a piece of paper containing wood pulp, with a  $1\frac{1}{2}$  per cent. solution of phloroglucin, and then adding a drop of diluted hydrochloric acid.

### PHOSPHORI PENTOXIDUM.

PHOSPHORUS PENTOXIDE.



*Synonyms.*—Phosphoric Anhydride; Phosphoric Oxide;  
Anhydrous Phosphoric Acid.

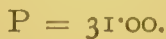
Phosphorus pentoxide,  $\text{P}_2\text{O}_5$ , is prepared by burning phosphorus in a current of dried air or oxygen in a suitably constructed apparatus.

It occurs as a snow-white, amorphous powder, or in white flakes, odourless, and very hygroscopic. If it contain traces of free phosphorus it becomes reddened on exposure to light. Soluble in water—for which it has a great attraction—with a hissing noise and elevation of temperature, forming metaphosphoric acid,  $\text{HPO}_3$ . It does not entirely dissolve at once, however, a portion resisting the action of the water for a considerable time. Commercial specimens occasionally contain unburnt phosphorus, which remains unaltered by the water. It should be free from arsenium, which may be derived from impure phosphorus used in its preparation.

On account of the rapidity with which it absorbs water, phosphorus pentoxide is used as a dehydrating agent, and acts powerfully as such when heated with sulphuric acid, nitric acid, alcohols, and many other bodies. It is also used for drying gases.

### PHOSPHORUS.

PHOSPHORUS.



Phosphorus is a non-metallic element which is widely distributed in nature and, as calcium phosphate, forms the chief constituent of bones. It may be obtained by treating calcined bones, or calcium phosphate from other sources, with sulphuric acid, to form a soluble

superphosphate, converting this into metaphosphate by the action of heat, and distilling the metaphosphate, the mixed vapours evolved being passed into warm water under which the phosphorus collects in the solid state. It may also be obtained by heating a mixture of calcium phosphate, sand, and coke, in the electric furnace, and is purified by means of chromic acid mixture, which oxidises various impurities.

It occurs in the form of cylindrical sticks, which are translucent, colourless, or pale yellow, wax-like, brittle at low temperatures, but soft and flexible at ordinary temperatures, and having a characteristic, disagreeable odour. It is luminous in the dark, and becomes covered with an opaque incrustation on keeping. Almost insoluble in water, to which, however, it imparts its characteristic and disagreeable odour and taste; soluble in carbon bisulphide (2 in 1), chloroform (about 1 in 25), absolute alcohol (about 1 in 350), ether (about 1 in 80), benzene, oleic acid, fixed oils, and fats. It is also soluble in turpentine and volatile oils, but not without some decomposition. Solutions in carbon bisulphide require care in dealing with them, as evaporation of the solvent is followed by instant ignition of the phosphorus. Specific gravity, 1.77. Melting-point,  $43.3^{\circ}$ ; boiling-point, about  $290^{\circ}$ , yielding a colourless vapour. It ignites in the air at a temperature a little above its melting-point, burning with a bright yellow characteristic flame, and producing dense white fumes of phosphoric anhydride. When slowly cooled after fusion it is crystalline; it may also be obtained in the form of octahedral crystals by evaporating a carbon bisulphide solution in an atmosphere of carbon dioxide. It volatilises slowly with the vapour of boiling water. On exposure to air it rapidly oxidises and ignites, on which account it is necessary to keep it under the surface of water, protected from light, and in a cool place. It unites directly with oxygen, sulphur, chlorine, iodine, bromine, and many metals. Arsenium, an impurity frequently present in phosphorus, is derived from the sulphuric acid used in its preparation; a small quantity of sulphur, also occasionally present, renders the phosphorus hard and somewhat brittle at ordinary temperatures. On boiling 1 or 2 grammes of phosphorus with 5 to 10 mls of nitric acid diluted with an equal volume of water, it should be attacked slowly, and be dissolved without residue; the resulting solution should give no reaction with the tests for arsenium, and be almost entirely free from sulphates.

Phosphorus is absorbed principally from the small intestine, where it is brought into a condition favourable to absorption by the fats and oils present. The solubility and other physical characters of yellow phosphorus render its absorption and consequent toxicity much greater than those of the red variety. It acts alike on all tissue cells, diminishing oxidation and yet increasing proteid break-down, so that whilst the urine contains an increased quantity of nitrogenous products, the carbonic acid output is diminished. The carbon, which should be given off as carbonic acid, collects in the tissues as lactic acid, and causes an acidæmia. It is even probable that the excess of

nitrogen, which occurs chiefly as ammonia, in the urine is due to the presence of this acid combined with ammonia. In the monographs on acids it is pointed out that diminution in the alkalinity of the blood is met by an increase in the ammonia supplied to the tissues. One other effect of this deficient oxidation is the production of fat in the tissues. The fatty change takes place in almost all tissues, in muscle, heart, intestinal epithelium, kidney and liver cells, etc. Practically all the changes produced in phosphorus poisoning are caused directly or indirectly through deficient oxidation and resulting fatty degeneration. The inhalation of phosphorus fumes by the workers in match factories lowers the vitality of accidentally exposed periosteum, such as may occur from a decayed or recently extracted tooth, to such an extent as to allow of the development of tuberculous periostitis and ostitis—the so-called “phossy jaw.” Phosphorus increases the growth in bones, which become more compact and firm; it is probable that these changes are due to some action on the bone marrow. Hence the use of phosphorus to develop more and denser bone in fractures, and in any condition in which it is desired to excite the activity of the bone-forming tissues. It is employed also in the treatment of rickets and osteomalakia. It has also been recommended but without *rationale* in various diseases of the central nervous system and in neuralgia. It is best administered in the form of phosphorated oil (1 in 100), which may be dispensed readily by mixing it with ten times its volume of almond oil, and emulsifying with gum acacia in the usual way. The oil may also be enclosed in capsules, or given with cod-liver oil. Tinctura Phosphori Composita, and simple and compound elixirs of phosphorus are also prepared and employed for administration of phosphorus in liquid form. For the preparation of pills, Sevum Phosphoratum (1 in 10) is commonly employed. This preparation may be readily incorporated with extracts, etc., by the addition of compound tragacanth powder, or powdered soap and liquorice, care being taken to avoid oxidation as far as possible by adding chloroform or carbon bisulphide to the mass, a few drops at a time, and mixing with a minimum of friction. Phosphorus pills should be freshly prepared, well varnished, and enclosed in a dark amber-coloured bottle. Phosphorus should not be handled and must be dispensed with the utmost care. It should be cut under water, and must always be dissolved for dispensing purposes, whether it is to be administered in liquid form or in pills, since solid particles of free phosphorus give rise to acute gastritis. The treatment of phosphorus poisoning consists in washing out the stomach with a 0·2 per cent. solution of potassium permanganate, which oxidises the phosphorus. If the patient is seen early, an emetic, preferably of copper sulphate, should be given. Turpentine is also used as an antidote, but is of little value. Mucilaginous drinks and alkalies should be given when the poisoning has developed, to neutralise lactic acid. Oils and fats must of course be avoided. In industrial occupations red phosphorus should wherever possible be substituted for the



yellow variety; respirators are of some benefit, and the atmosphere may be impregnated with turpentine.

*Dose*.—0·6 to 3 milligrams ( $\frac{1}{100}$  to  $\frac{1}{20}$  grain).

*NOTES*.—When the yellow or vitreous variety of phosphorus is heated for a considerable time to about  $232^{\circ}$  *in vacuo*, or in an atmosphere in which it cannot burn (carbon dioxide for example), it becomes converted into the allotropic modification of the element, red or so-called amorphous phosphorus. This has properties different from those of ordinary phosphorus, as it is non-luminous, non-poisonous, only slowly oxidised in moist air, unflammable by friction or even on heating below  $260^{\circ}$ , and evolves no vapour. It is insoluble in the ordinary solvents and becomes nearly black on being boiled with potassium hydroxide solution. It occurs usually as a dark red or purplish micro-crystalline mass or powder, but may be obtained of a bright scarlet, the colour depending on the temperature at which it has been prepared. Its specific gravity is 2·140, while that of vitreous phosphorus is 1·830.

### PHYSOSTIGMATIS SEMINA.

CALABAR BEANS.

*Synonyms*.—Physostigma; Ordeal Beans.

Calabar beans are the ripe seeds of *Physostigma venenosum*, Balfour (N.O. Leguminosæ), a climbing plant indigenous to the West Coast of Africa.

The beans are dark chocolate brown in colour, and reniform in shape, about 25 millimetres long, 18 millimetres broad, and 12 millimetres thick, with a deep groove (the hilum) extending almost the length of the arched side. Surface somewhat rough, but with a dull polish. Cut transversely they exhibit a thick, brown shell surrounding two large, firm, white, starchy cotyledons, which enclose a large cavity, the air in which causes the entire seeds to float upon water. The odour and taste are not characteristic.

The chief constituent of Calabar beans is the alkaloid physostigmine (eserine), with which are associated small quantities of eseridine and eseramine. Physostigmine forms large crystals melting at  $105^{\circ}$  to  $106^{\circ}$ ; it is tasteless, lævo-rotatory, sparingly soluble in water, readily in alcohol, ether, chloroform, benzene, and carbon bisulphide. Its characteristic reaction is described under Physostigminæ Sulphas. Eseridine is crystalline, and changes, on heating with a mineral acid, into physostigmine; it has but little action on the pupil of the eye, and is not employed medicinally. Eseramine crystallises in needles, melting at  $238^{\circ}$  to  $240^{\circ}$ . Calabarine, which was formerly considered to be a constituent of the seeds, does not exist in them pre-formed. The total alkaloid varies from 0·15 to 0·3 per cent. The seeds contain abundance of starch, and yield about 4 per cent. of ash.

The properties of Calabar beans are virtually those of the alkaloid physostigmine (see Physostigminæ Sulphas). An extract and a tincture are prepared from the crude drug. They are employed in tetanus, in hemiplegia and paraplegia, in locomotor ataxy, and in strychnine poisoning. The extract may be given in pills or cachets, or as a solution prepared for hypodermic use by dissolving it in water and clearing by filtration. In cases of poisoning by Calabar beans, the stomach should be

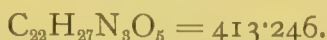
evacuated, and atropine injected until the pulse quickens or the symptoms pass off.

*Dose*.—3 to 10 centigrams ( $\frac{1}{2}$  to  $1\frac{1}{2}$  grains).

NOTES.—The seeds of *Entada scandens* (Garbee beans), of *Mucuna urens* (horse-eye beans), and of *Pentaclethra macrophylla* have been offered as Calabar beans; they bear scarcely any resemblance to the genuine. A seed very similar in appearance to Calabar beans, but nearly cylindrical in shape and with a shorter hilum, has also been imported; the plant yielding it, which is unknown, has been named *Physostigma cylindrospermum*, Holmes; it is said to contain eserine.

## PHYSOSTIGMINÆ SALICYLAS.

PHYSOSTIGMINE SALICYLATE.



*Synonym*.—Eserine Salicylate.

Physostigmine salicylate,  $\text{C}_6\text{H}_4(\text{OH})\text{COOH}\cdot\text{C}_{15}\text{H}_{21}\text{N}_3\text{O}_2$ , a salt of the alkaloid physostigmine, may be prepared by neutralising a solution of 10 of physostigmine in warm ether with a solution of 10 of salicylic acid in ether until a drop of the liquid on moistened blue litmus paper produces a faint reddening. After the crystals have separated, they are collected and dried at a very gentle heat.

The salt occurs in the form of colourless or slightly yellow, glistening needles, or short columnar crystals, odourless, and having a faintly bitter taste. Solutions should only be tasted with caution. The salicylate is the most stable salt of physostigmine. Soluble in water (1 in 130); and in alcohol (1 in 12). The diluted aqueous solution is neutral; the concentrated alcoholic solution reddens blue litmus paper slightly. The aqueous solution becomes pink on standing for some time, owing to formation of rubreserine. It softens on heating and becomes slightly yellow at  $160^\circ$ , melting at  $179^\circ$ . On ignition it leaves no residue. The aqueous solution gives with ferric chloride a deep violet colouration (due to the salicylic acid); with calcium hypochlorite a red colouration; with a drop of caustic alkali solution a cherry-red, changing to darker red, and, finally, to a green colour. On evaporating an aqueous solution to dryness with a few drops of ammonia water a blue residue is produced which is soluble in alcohol, this solution yielding a red fluorescence on the addition of excess of acetic acid. A few milligrams dissolved in nitric acid gives a yellow solution, which on heating changes to orange and then blood-red, and on evaporation to dryness yields a green residue. This on exposure to the fumes of nitric acid becomes violet-blue, and when a drop of nitric acid is added it forms a beautiful reddish-violet solution, which soon changes to blood-red, and finally, on standing or on dilution, becomes greenish-yellow. Concentrated sulphuric acid produces a colourless solution, becoming yellow after a time. Sulphuric acid containing a drop of formaldehyde solution in each mil gives a bright pink colour when added to the salt; if sulphuric acid and a few grains of cane sugar be added a yellow colour is produced, turning to brown, then to purple, and lastly to greenish-black. It is more

stable than the other salts of the alkaloid, and is similarly employed, but its sparing solubility in water stands in the way of its more general use.

The action of physostigmine and its salts is described under *Physostigminæ Sulphas*. The salicylate is preferred to the sulphate for the preparation of eye-drops, as its solutions do not so readily become pink in colour. The colouration of solutions of physostigmine salts, due to oxidation, can be prevented by the addition of a trace of boric, hypophosphorous, or sulphurous acid (see under *Physostigminæ Sulphas*).

*Dose*.—1 to 3 milligrams ( $\frac{1}{80}$  to  $\frac{1}{20}$  grain).

### PHYSOSTIGMINÆ SULPHAS.

PHYSOSTIGMINE SULPHATE.



*Synonym*.—Eserine Sulphate.

Physostigmine sulphate,  $(\text{C}_{15}\text{H}_{21}\text{N}_3\text{O}_2)_2, \text{H}_2\text{SO}_4$ , a salt of the alkaloid physostigmine, may be prepared by adding sulphuric acid (10 per cent.) to a solution of physostigmine in ether, drop by drop, until separation of the crystalline sulphate ceases. The salt is collected and carefully dried at a temperature of about  $40^\circ$ .

It occurs as a yellowish-white microcrystalline powder, very deliquescent, odourless, and having a bitter taste, gradually becoming reddened on exposure to air and light, owing to formation of rubreserine, a product of oxidation, which is insoluble in ether, but soluble in chloroform and in carbon bisulphide. Physostigmine sulphate is soluble in water (4 in 1), in alcohol ( $2\frac{1}{2}$  in 1), soluble in chloroform, but not very soluble in ether. The aqueous solution, colourless at first, becomes pink on keeping, like the salt, and is neutral to litmus paper, or only very faintly acid. Heated to  $130^\circ$  it becomes soft, and at  $140^\circ$  melts without decomposition. On ignition it leaves no residue. An aqueous solution when shaken with diluted solution of potassium hydroxide becomes red; and when mixed with solution of ammonia, and evaporated on the water-bath, it leaves a bluish residue, the solution of which in very dilute acids is fluorescent, red by reflected, and blue by transmitted light. With gold chloride it produces a purple colour. The salt with concentrated sulphuric acid gives only a faint yellow colour, but with sulphuric acid containing a crystal of potassium iodate a light purple colour is produced, changing at once to yellowish-red.

The action of physostigmine (eserine) on involuntary muscle and on secretory glands closely resembles that of pilocarpine. Applied to the eye, it causes great constriction of the pupil; the effect is local, and is due mainly to stimulation of the terminations of the third nerve; intra-ocular pressure is largely reduced as a result of the contraction. Other plain muscle is affected by physostigmine in much the same way; gastric movements are increased and vomiting may result, intestinal peristalsis



is exaggerated with production of liquid motions, owing to the hurried passage of the intestinal contents, the bladder and uterine movements are augmented and the bronchioles constricted. All these effects are antagonised by atropine. A similar stimulation of the peripheral nerve-endings in glands results in an increase of their secretions, especially in the case of the sudoriferous, salivary, mucous, and lachrymal glands. The action of physostigmine on the circulation is to slow the pulse and raise blood pressure. It depresses the central nervous system, causing muscular weakness and diminished reflexes. Very large doses excite motor nerve-endings, and so cause irregular twitchings. Physostigmine has been employed internally for its depressant action on the central nervous system in epilepsy, chorea, etc., but has not proved of much service. It is given hypodermically in acute tetanus. The chief use of physostigmine is for its action on the eye; under its influence the pupil commences to contract in five to fifteen minutes, reaches the maximum contraction in thirty minutes, and remains contracted for more than twelve hours. The muscles regulating accommodation are also affected, but they regain their normal condition in three to four hours. Physostigmine is employed to correct the dilatation caused by atropine, homatropine, or cocaine. It is used in glaucoma to decrease intra-ocular pressure, but whether this is brought about by lessening the secretion of fluid or by facilitating its escape is not yet clear. For ophthalmic use, Lamellæ Physostigminæ and 0.25 to 1 per cent. solutions in sterile distilled water are employed. Neutral solutions rapidly become pink in colour; this may be to a great extent avoided by dissolving the alkaloidal salt in a weak solution of boric acid (2 per cent.). The addition of sulphurous or hypophosphorous acid to solutions of eserine sulphate has been suggested in order to prevent this colouration; the use of powerful deoxidising agents is unnecessary, and offers no advantage for the purpose over the weak acidity of the boric acid solution. For internal use the sulphate may be given in pills, the salt being carefully triturated with milk sugar, and massed with glycerin of tragacanth. In cases of poisoning by physostigmine the stomach should be washed out, and atropine and strychnine administered hypodermically.

*Dose.*—1 to 3 milligrams ( $\frac{1}{80}$  to  $\frac{1}{20}$  grain).

*Notes.*—Pure physostigmine is in colourless or pale pink crystals, very slightly soluble in water, soluble in castor oil (1 in 100), and in melted soft paraffin (1 in 180). It is employed in the preparation of ointments and oily drops for application to the eye as myotics.

## PHYTOLACCA.

### POKE ROOT.

Poke root is obtained from *Phytolacca decandra*, L. (N.O. Phytolaccaceæ), a large herb widely distributed in Eastern and Central North America.

The drug occurs in transverse, oblique, or longitudinal slices of sparingly branched, nearly cylindrical roots, rarely exceeding 7 centimetres in diameter. The outer surface is yellowish or reddish-brown in colour, longitudinally wrinkled and marked with narrow transverse bars of cork. The transverse section exhibits numerous concentric rings of narrow, fibrovascular bundles, alternating with rings of parenchymatous tissue; in longitudinal slices the vascular strands are prominent, the intervening parenchyma being much contracted. Many of the pieces appear very fibrous from the separation and disintegration of the zones. The drug has no odour, but a sweetish taste, which afterwards becomes very acrid; the powder is a powerful sternutatory. Poke root closely resembles belladonna root, and the root of either *Phytolacca decandra* or an allied species has been mixed with belladonna. It may be distinguished by its abnormal structure, and by the presence of acicular crystals of calcium oxalate in the place of the sandy crystals of belladonna root.

The principal constituent of the drug appears to be an amorphous, bitter and acrid substance, similar to, if not identical with, saponin. It also contains a small amount of a colourless crystalline alkaloid, phytolaccine, and an amorphous organic acid, phytolaccic acid, as well as sugar (10 per cent.), starch (10 per cent.), calcium oxalate (6 per cent.). It yields about 13 per cent. of ash.

Poke root is a slow-acting emetic, a purgative, and a mild narcotic, but its action has not been clearly ascertained, and the drug should be used with caution. It is employed in chronic rheumatism, usually in the form of liquid extract, which is also recommended as an application to inflamed and painful mammæ. An ointment (1 in 8) has been used in tinea capitis and sycosis, and a strong infusion of the root has been recommended as a local application for piles. An eclectic resinoid, phytolaccin, is prepared and given in doses of 3 to 18 centigrams ( $\frac{1}{2}$  to 3 grains) for rheumatism and syphilis.

*Dose.*—6 to 30 centigrams (1 to 5 grains) as an alterative; 1 gramme (15 grains) as an emetic.

## PICRORHIZA.

### PICRORHIZA.

Picrorhiza is the dried rhizome of *Picrorhiza Kurroa*, Royle (N.O. Scrophularineæ), a small plant indigenous to the Alpine Himalayas.

The drug occurs in greyish-brown, more or less cylindrical species, about 2.5 to 5 centimetres long and 4 to 8 millimetres in diameter. The rhizome is often deeply wrinkled longitudinally and covered with a thin cork. It exhibits the transverse scars of cataphyllary leaves, numerous small, black buds, but only an occasional root or root scar; near the apex the black remains of closely approximate scaly leaves may be found. The rhizome, which is very light in weight, breaks readily with a short fracture, disclosing a very dark, lacunous interior. The section exhibits a thin, pale grey cork and a narrow ring of tangentially extended wood bundles.

The chief constituent of the rhizome is a bitter, crystalline

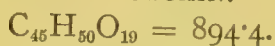
glucoside, picrorhizin, which yields on hydrolysis picrorhizetin and dextrose.

Picrorhiza is a bitter, and is best administered in combination with aromatics. A liquid extract and tincture are prepared, and are official in India and the Eastern Colonies for use as "tonics" and antiperiodics.

*Dose*.—6 to 30 decigrams (10 to 50 grains).

## PICROTOXINUM.

PICROTOXIN.



*Synonym*.—Cocculin.

Picrotoxin,  $\text{C}_{45}\text{H}_{50}\text{O}_{19}$ , a neutral principle obtained from the fruit of *Anamirta paniculata*, Colebrooke (N.O. Menispermaceæ), may be prepared by exhausting the powdered *Cocculus Indicus* with boiling alcohol, concentrating the liquid by distillation, and evaporating to a low bulk; on cooling, the fat is removed, and the residue boiled with water; the aqueous solution is filtered while hot, the filtrate slightly acidified, and crystallised. The crystals are purified by dissolving in hot strong alcohol, adding animal charcoal, filtering while hot, and allowing to crystallise.

It occurs in the form of colourless shining prismatic crystals, or as a microcrystalline powder, odourless, intensely bitter, poisonous, permanent in the air. Soluble in cold water (1 in 334), in boiling water (1 in 35), in cold alcohol (1 in 13½), in boiling alcohol (1 in 3), in solution of potassium hydroxide (1 in 10), in amyl alcohol, benzene, ether, chloroform, glacial acetic acid. The aqueous solution is neutral, and reduces ammoniacal silver nitrate and Fehling's solution on heating. The alcoholic solution is lævo-rotatory. Its solution in acids and alkalies is not attended by formation of salts, but it is precipitated from alkaline solutions by carbon dioxide. Amyl alcohol, benzene, and chloroform extract the principle from acid, but not from alkaline solutions. The aqueous solution is not precipitated by solutions of mercuric chloride, platinic chloride, or tannic acid (difference from alkaloids). Melting-point, 193° to 200°; repeated crystallisation, however, ensures a melting-point of 199° to 200°.

It has been suggested that picrotoxin is a mixture of picrotoxinin,  $\text{C}_{15}\text{H}_{16}\text{O}_6$ , and picrotin,  $\text{C}_{15}\text{H}_{18}\text{O}_7$ , in the proportion of 66 per cent. of the former to 34 per cent. of the latter, but the point is disputed. The crystals melt on heating, forming a yellow liquid, charring on further heating, and on ignition it is entirely consumed without leaving any residue. It dissolves in sulphuric acid with a saffron-yellow colouration, passing to a red violet on the addition of potassium bichromate. A trace of picrotoxin treated with a 20 per cent. solution of benzaldehyde in alcohol, and a drop of concentrated sulphuric acid added, produces a red colour which, on gently stirring, forms red streaks throughout the liquid. If a mixture of



picrotoxin and three times its weight of potassium nitrate be moistened with strong sulphuric acid, and a strong solution of sodium hydroxide be added, an intense red colour will be developed. By bromination, or by the action of hydrochloric acid on its ethereal solution, it is readily decomposed into picrotoxinin and picrotin.

Picrotoxin is a powerful convulsive poison, differing from strychnine in that it acts mainly on the medulla. It is used principally to check the profuse night-sweats of phthisis, through its action in accelerating respiration, thus removing the partial asphyxia and so preventing stimulation of the nervous mechanism governing perspiration; but it is successful only in a certain proportion of cases. Picrotoxin was at one time used to adulterate beer, giving it a fictitious reputation as an intoxicant. It is best administered in pills, the drug being triturated with sugar of milk and the mass prepared with glycerin of tragacanth. A solution in water (1 in 400) is used by hypodermic injection. It has been used as an antidote in morphine poisoning; also in the form of ointment (1 in 50) as a parasiticide, but it is too dangerous a substance for use in this way. In cases of poisoning by picrotoxin, the stomach should be washed out, and chloral hydrate and potassium bromide given.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  milligrams ( $\frac{1}{100}$  to  $\frac{1}{25}$  grain).

### PIGMENTUM CALAMINÆ.

#### CALAMINE PAINT.

Prepared Calamine	...	...	...	...	30'00
Zinc Oxide	...	...	...	...	15'00
Glycerin	...	...	...	...	10'00
Rose Water, sufficient to produce	...	...	...	...	100'00

Triturate the calamine and zinc oxide in a mortar with successive portions of the rose water, and add the glycerin.

This paint is a thick liquid, suitable for applying to the skin with a camel-hair mop; it is soothing and astringent.

### PIGMENTUM CHRYSAROBINI.

#### CHRYSAROBIN PAINT.

Chrysarobin	...	...	...	...	10'00
Solution of Gutta Percha, sufficient to produce	...	...	...	...	100'00

Dissolve the chrysarobin in the solution of gutta percha.

This paint is applied to the skin with a stiff brush in chronic psoriasis. It has the advantage over chrysarobin ointments of not staining the linen.

### PIGMENTUM IODI.

#### IODINE PAINT.

Iodine	...	...	...	...	20'00
Potassium Iodide	...	...	...	...	20'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the iodine and potassium iodide in the distilled water.

This preparation is painted on the skin, etc., to destroy parasitic fungi, and is used as a counter-irritant in place of *Liquor Iodi Fortis*.

### PIGMENTUM IODI CARBOLISATUM.

#### CARBOLISED IODINE PAINT.

Iodine	...	...	...	...	...	1'00
Potassium Iodide	...	...	...	...	...	1'00
Phenol	...	...	...	...	...	1'00
Glycerin	...	...	...	...	...	50'00
Distilled Water, sufficient to produce	...	...	...	...	...	100'00

Dissolve the phenol in the glycerin, rub down the iodine with the potassium iodide and a little distilled water, mix the two solutions, and add sufficient distilled water to make up the required volume.

This paint is an antiseptic and stimulating application for the throat.

NOTE.—Carbolised iodine paint half the above strength is sometimes used.

### PIGMENTUM IODI COMPOSITUM.

#### COMPOUND IODINE PAINT.

*Synonym.*—Mandl's Paint.

Iodine	...	...	...	...	...	1'25
Potassium Iodide	...	...	...	...	...	5'50
Oil of Peppermint	...	...	...	...	...	0'75
Glycerin, sufficient to produce	...	...	...	...	...	100'00

Dissolve and add the oil of peppermint.

This paint is an antiseptic and stimulant application for the throat.

### PIGMENTUM IODOFORMI COMPOSITUM.

#### COMPOUND IODOFORM PAINT.

*Synonym.*—Whitehead's Varnish.

Benzoin, in coarse powder	...	...	...	...	10'00
Prepared Storax	...	...	...	...	7'50
Balsam of Tolu	...	...	...	...	5'00
Socotrine Aloes	...	...	...	...	2'00
Iodoform	...	...	...	...	10'00
Methylated Ether (0'720), sufficient to produce	...	...	...	...	100'00

Macerate the benzoin, storax, balsam of tolu, aloes, and iodoform with 80 of ether for seven days, frequently agitating; filter and pass sufficient of the ether through the filter to produce 100 of the paint.

This preparation is used in surgery as a dressing to raw surfaces especially the tongue.

**PIGMENTUM MENTHOLIS COMPOSITUM.**

## COMPOUND MENTHOL PAINT.

Menthol ...	...	...	...	...	...	0·25
Thymol ...	...	...	...	...	...	0·25
Oil of Eucalyptus	...	...	...	...	...	12·50
Liquid Paraffin, sufficient to produce	...	...	...	...	...	100·00

Dissolve the menthol, thymol, and oil of eucalyptus in the liquid paraffin.

This preparation is applied with a brush to the nasal mucous membrane for hay fever and catarrh.

**PIGMENTUM MENTHOLIS ET TOLUOL.**

## MENTHOL AND TOLUOL PAINT.

*Synonym.*—Löffler's Pigment or Solution.

Menthol ...	...	...	...	...	...	10·00
Absolute Alcohol	...	...	...	...	...	60·00
Solution of Ferric Chloride	...	...	...	...	...	4·00
Toluol, sufficient to produce	...	...	...	...	...	100·00

Dissolve the menthol and toluol in the absolute alcohol, and add the solution of ferric chloride.

This preparation is applied as an antiseptic to the false membrane of diphtheria.

**PIGMENTUM PICIS CUM IODO.**

## TAR AND IODINE PAINT.

*Synonyms.*—Pigmentum Iodi et Olei Picis; Pasta Iodi et Picis; Coster's Paste.

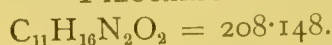
Iodine ...	...	...	...	...	...	20·00
Rectified Oil of Tar	...	...	...	...	...	80·00

Dissolve with the aid of gentle heat. As the oil of tar is inflammable, heat should be applied cautiously.

This preparation is useful as an application for ringworm.

**PILOCARPINA.**

## PILOCARPINE.



Pilocarpine is an alkaloid obtained commercially from jaborandi leaves, in which it occurs in very variable quantity, but rarely more than 0·5 per cent., and is associated with a small proportion of its isomer, isopilocarpine. The pure alkaloid is best obtained by adding excess of ammonia to an aqueous solution of one of its salts and extracting with chloroform, washing the latter to remove ammonia. On evaporation or distillation of the chloroform, a colourless oily liquid remains which may be freed from the



last traces of solvent by exposing to the air in an open dish for several days. All efforts to crystallise the base have so far failed.

It occurs as a colourless thick syrupy liquid, which becomes thinner on warming. Easily soluble in water, alcohol, and chloroform. With acids it forms salts which crystallise well, the most useful medicinally being the nitrate, on account of its stability in the air. The hydrochloride is hygroscopic. By the action of heat or alkalis it is readily converted into its isomer, isopilocarpine; the conversion is quantitative by heating with water in a sealed tube at  $180^{\circ}$  for four hours. The isomer is very similar in its chemical properties to pilocarpine: it is a syrup which can be distilled unchanged *in vacuo*, and forms crystalline salts with acids. It occurs naturally in small quantity in the leaves of the above-named plants, but the greater portion is formed during the process of manufacture. The properties of pilocarpine are described in the monograph on *Pilocarpinæ Nitras*, its most commonly used salt.

## PILOCARPINÆ HYDROCHLORIDUM.

### PILOCARPINE HYDROCHLORIDE.



Pilocarpine hydrochloride,  $\text{C}_{11}\text{H}_{16}\text{N}_2\text{O}_2, \text{HCl}$ , may be prepared by dissolving the base obtained from the pure nitrate in sufficient diluted hydrochloric acid to form a neutral solution, concentrating and setting aside over sulphuric acid to crystallise.

It occurs in the form of colourless, odourless crystals, deliquescent in moist air. Freely soluble in water, and also soluble in absolute alcohol (1 in 10), but almost insoluble in ether or chloroform. Melting-point,  $204^{\circ}$  to  $205^{\circ}$ ; rotation  $+90^{\circ}$  to  $+92^{\circ}$ . The aqueous solution has a faintly bitter taste, and is neutral or only faintly acid to litmus. Sulphuric acid dissolves it with production of hydrochloric acid gas, and the formation of a colourless liquid; on the addition of a small fragment of potassium bichromate, a bright grass-green colouration is produced. The concentrated aqueous solution gives no precipitate on addition of solution of ammonia, and only a few oily drops on the addition of aqueous solution of sodium or potassium hydroxide, but these quickly redissolve (distinction from most other alkaloids). Dissolve 1 to 2 centigrams in 2 mls of water in a test-tube, add 2 mls of a slightly acid solution of hydrogen peroxide, and carefully pour on the liquid a small layer of benzene; then add 3 or 4 drops of a 0.3 per cent. solution of potassium bichromate and shake gently; the benzene layer will turn violet, while the aqueous solution will remain yellow. A mixture of equal parts of the salt and calomel, moistened with alcohol, becomes blackened. The salt contains no water of crystallisation. On complete ignition it leaves no residue (absence of inorganic impurities).

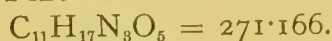
The properties of pilocarpine and its salts are described under

*Pilocarpinæ Nitras.* The hydrochloride is frequently prescribed in preference to the nitrate, but it must not be ordered with silver salts, on account of its incompatibility.

*Dose.*—3 to 30 milligrams ( $\frac{1}{20}$  to  $\frac{1}{2}$  grain).

### PILOCARPINÆ NITRAS.

PILOCARPINE NITRATE.



Pilocarpine nitrate,  $\text{C}_{11}\text{H}_{16}\text{N}_2\text{O}_2\text{HNO}_3$ , a salt of the alkaloid pilocarpine, obtained from jaborandi leaves. It may be prepared by neutralising diluted nitric acid with pure pilocarpine and evaporating the neutral aqueous solution thus obtained to dryness on a water-bath. The residue is taken up with boiling alcohol, from which it is allowed to crystallise. 100 parts of the salt contain 76.75 parts of the base.

It occurs in the form of white, distinct crystals, or as a micro-crystalline powder, odourless and having a faintly bitter taste; anhydrous; permanent in the air. Soluble in water (1 in 8), in alcohol (1 in 50), fairly soluble in boiling alcohol, almost insoluble in ether or chloroform. Melting-point not below  $173^\circ$ . A concentrated aqueous solution gives no precipitate on the addition of solution of ammonia, nor with solutions of sodium or potassium hydroxide (distinction from other alkaloids). If 1 or 2 centigrams of the salt be dissolved in 2 mils of distilled water in a test-tube, 2 mils of a slightly acidified solution of hydrogen peroxide added and a small layer of benzene be carefully poured upon the liquid, then if 3 or 4 drops of a solution of potassium bichromate (1 in 300) be added and the mixture gently shaken, the benzene layer will acquire a violet colour, while the aqueous layer will remain yellow (distinction from other alkaloids). Strong sulphuric acid dissolves the salt, forming a colourless solution, and on adding a little potassium bichromate an emerald or grass-green colour is gradually produced.

Pilocarpine stimulates the terminations of certain nerves supplying unstriped muscle, the heart, and secretory glands. After administration of the drug the secretion of the salivary, sweat, gastric, intestinal, lachrymal, and mucous glands of the mouth, nose, and respiratory tract is augmented. Its action on plain muscle results in increased movements in the alimentary tract, causing perhaps nausea, colic pains, and diarrhoea. The bronchioles are constricted, so that the amount of air entering and leaving the lungs is very much diminished, an "asthmatic" condition resulting. Its action upon the terminations of the third nerve in the eye causes contraction of the pupil, with reduced intra-ocular pressure. Small doses of pilocarpine quicken the heart and raise blood pressure, but large doses have the opposite effect. Pilocarpine nitrate is given by the mouth or hypodermically, principally as a powerful diaphoretic, especially in dropsy due to renal disease and in uræmia,

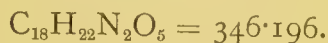
but it is contra-indicated in cardiac dropsy. It is sometimes given in bronchitis and in asthma to stimulate the broncho-dilator fibres when the constrictor fibres are fatigued. In ophthalmic surgery, pilocarpine nitrate is employed like physostigmine to contract the pupil and reduce intra-ocular pressure in glaucoma, detachment of the retina and intra-ocular hæmorrhage. A slight increase of tension at first occurs, and the contraction is less complete and of shorter duration than that produced by physostigmine. The action of pilocarpine is in all cases antagonised by atropine. Pilocarpine nitrate is best administered by hypodermic injection in doses of from  $\frac{1}{10}$  to  $\frac{1}{4}$  grain. Pills may be prepared with sugar of milk and glucose. Larger initial doses than  $\frac{1}{20}$  grain by the mouth are not well tolerated. For ophthalmic use 0.5 per cent. solutions are suitable. Pilocarpine nitrate has been used with good results in various diseases of the ear, and it has been recommended for use in lotions (1 in 250) to promote the growth of the hair, its effect being attributed to stimulation of the glands of the scalp. In cases of poisoning by pilocarpine, belladonna should be given by the mouth or atropine hypodermically.

*Dose.*—3 to 30 milligrams ( $\frac{1}{20}$  to  $\frac{1}{2}$  grain).

*NOTES.*—Commercial pilocarpine nitrate is said to contain variable amounts of isopilocarpine nitrate, which lower the melting-point, the chemically pure salt melting at  $177^{\circ}$  to  $178^{\circ}$ . Rotation in aqueous solution, not lower than  $+80$ . On ignition it leaves no residue.

## PILOCARPINÆ SALICYLAS.

### PILOCARPINE SALICYLATE.



Pilocarpine salicylate,  $C_{11}H_{16}N_2O_2C_7H_6O_3$ , a salt of the alkaloid pilocarpine, may be prepared by neutralising 10 parts of pilocarpine in dilute alcoholic solution with about 6.7 parts of salicylic acid, evaporating the solution to dryness, taking up the residue with hot alcohol, and allowing to crystallise. 100 parts of the salt contain 60.12 parts of the base.

It occurs in small, colourless, crystalline leaves, or as a white, crystalline powder, having a weak, bitter taste. Easily soluble in water, less so in alcohol, the solutions having a slightly acid reaction. Melting-point,  $120^{\circ}$ . It leaves no residue on ignition. It dissolves in concentrated sulphuric acid without colour. With fuming nitric acid it dissolves with a yellowish-brown colouration. The aqueous solution produces with ferric chloride a deep violet colouration. It is not precipitated by solution of ammonia or potassium bichromate. Solution of sodium hydroxide produces (only in the concentrated aqueous solution) a separation of the base in the form of oily drops, which, however, dissolve on adding excess of the alkali.

Pilocarpine salicylate has properties closely resembling those of pilocarpine nitrate, and is used for similar purposes.

*Dose.*—3 to 30 milligrams ( $\frac{1}{20}$  to  $\frac{1}{2}$  grain).



**PILULÆ ALOES BARBADENSIS.**

## BARBADOS ALOES PILLS.

	In 100 parts	In 1 pill about
Barbados Aloes, in powder ... ..	48·00	2 grains
Hard Soap, in powder ... ..	24·00	1 grain
Oil of Caraway ... ..	3·00	$\frac{1}{8}$ minim

Confection of Roses, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTE.—Pilulæ Aloes, U.S.P., are prepared by massing equal parts of purified aloes and hard soap with water.

**PILULÆ ALOES COMPOSITÆ.**

## COMPOUND ALOES PILLS.

*Synonym.*—Baird's Pills.

	In 100 parts.	In 1 pill about
Barbados Aloes, in powder ... ..	30·00	1·20 grain
Ipecacuanha Root, in powder ... ..	6·00	0·24 grain
Scammony, in powder ... ..	30·00	1·20 grain
Green Extract of Hyoscyamus ... ..	30·00	1·20 grain

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ ALOES DILUTÆ.**

## MILD ALOES PILLS.

*Synonym.*—Marshall Hall's Pills.

	In 100 parts	In 1 pill about
Barbados Aloes ... ..	25·00	1 grain
Extract of Liquorice ... ..	25·00	1 grain
Hard Soap, thinly sliced ... ..	25·00	1 grain
Treacle ... ..	25·00	1 grain

Distilled Water, a sufficient quantity.

Dissolve the aloes in water, and strain; add the other ingredients to the strained liquid, mix, evaporate to a pilular consistence, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ ALOES ET ASAFETIDÆ.**

## ALOES AND ASAFETIDA PILLS.

	In 100 parts	In 1 pill about
Socotrine Aloes, in powder ... ..	25·00	1 grain
Asafetida, in powder ... ..	25·00	1 grain
Hard Soap, in powder ... ..	25·00	1 grain

Confection of Roses, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ ALOES ET FERRI.**

## ALOES AND IRON PILLS.

	In 100 parts	In 1 pill about
Exsiccated Ferrous Sulphate ...	... 11.00	$\frac{1}{2}$ grain
Barbados Aloes, in powder ...	... 22.00	1 grain
Compound Powder of Cinnamon ...	... 33.00	$1\frac{1}{2}$ grains

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTE.—Pilulæ Aloes et Ferri, U.S.P., are prepared by massing equal parts of exsiccated ferrous sulphate, purified aloes, and aromatic powder with confection of rose,

**PILULÆ ALOES ET MASTICHES.**

## ALOES AND MASTIC PILLS.

*Synonym.*—Dinner Pills.

	In 100 parts.	In 1 pill about
Barbados Aloes, in powder ...	... 65.00	2.60 grains
Mastic, in powder ...	... 20.00	0.80 grain
Confection of Roses ...	... 15.00	

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTES.—Pills produced by slight variants on this formula are known as Lady Webster's Pills, Lady Hesketh's Pills, Dr. Thomson's Antibilious Pills, and Crespigny's Pills. Chapman's Dinner Pills contain each aloes,  $1\frac{1}{2}$  grains; mastic,  $1\frac{1}{2}$  grains; ipecacuanha root, 1 grain; and oil of fennel about  $\frac{1}{4}$  minim. Gregory's Dinner Pills contain equal quantities of extract of Barbados aloes, ipecacuanha root, rhubarb root, and hard soap, massed with distilled water and divided into 5-grain pills. Pilulæ Aloes et Mastiches, U.S.P., are prepared by massing 13 of purified aloes, 4 of mastic, and 3 of red rose petals with 49 per cent. alcohol.

**PILULÆ ALOES ET MYRRHÆ.**

## ALOES AND MYRRH PILLS.

*Synonyms.*—Pilulæ Rufi; Rufus Pills.

	In 100 parts	In 1 pill about
Socotrine Aloes, in powder ...	... 44.00	2 grains
Myrrh, in powder ...	... 22.00	1 grain

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTE.—Pilulæ Aloes et Myrrhæ, U.S.P., are prepared by massing 13 of purified aloes, 6 of myrrh, and 4 of aromatic powder with syrup.

**PILULÆ ALOES ET NUCIS VOMICÆ.**

## ALOES AND NUX VOMICA PILLS.

	In 100 parts	In 1 pill about
Barbados Aloes ... ..	80·00	2 grains
Extract of Nux Vomica ... ..	10·00	$\frac{1}{4}$ grain
Alcoholic Extract of Belladonna ... ..	6·50	$\frac{1}{8}$ grain
Alcohol (60 per cent.), a sufficient quantity.		

Mix to form a mass, and divide into pills weighing about 15 centigrams ( $2\frac{1}{2}$  grains) each, and containing 15 milligrams ( $\frac{1}{4}$  grain) of extract of nux vomica.

*Dose.*—1 pill.

**PILULÆ ALOES SOCOTRINÆ.**

## SOCOTRINE ALOES PILLS.

	In 100 parts	In 1 pill about
Socotrine Aloes, in powder ... ..	48·00	2 grains
Hard Soap, in powder ... ..	24·00	1 grain
Oil of Nutmeg ... ..	3·00	$\frac{1}{8}$ minim
Confection of Roses, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ ALOINI COMPOSITÆ.**

## COMPOUND ALOIN PILLS.

*Synonym.*—Sir Andrew Clark's Liver Pills.

	In 100 parts	In 1 pill about
Aloin ... ..	20·00	$\frac{1}{2}$ grain
Extract of Nux Vomica ... ..	20·00	$\frac{1}{2}$ grain
Ferrous Sulphate ... ..	20·00	$\frac{1}{2}$ grain
Myrrh, in powder ... ..	20·00	$\frac{1}{2}$ grain
Hard Soap, in powder ... ..	20·00	$\frac{1}{2}$ grain

Mix to form a mass, and divide into pills weighing 15 centigrams ( $2\frac{1}{2}$  grains) each.

*Dose.*—1 pill.

NOTE.—These pills are sometimes ordered with the addition of 3 centigrams ( $\frac{1}{2}$  grain) each of ipecacuanha and extract of belladonna, to each pill.

**PILULÆ ALOINI ET PODOPHYLLI COMPOSITÆ.**

## COMPOUND ALOIN AND PODOPHYLLUM PILLS.

	In 100 parts	In 1 pill about
Aloin ... ..	20·00	$\frac{1}{10}$ grain
Oleoresin of Capsicum ... ..	10·00	$\frac{1}{20}$ grain
Jalap Resin ... ..	20·00	$\frac{1}{10}$ grain
Podophyllum Resin ... ..	30·00	$\frac{3}{20}$ grain
Extract of Nux Vomica ... ..	10·00	$\frac{1}{20}$ grain
Green Extract of Hyoscyamus ... ..	10·00	$\frac{1}{20}$ grain



Mix to form a mass, and divide into pills weighing 3 centigrams ( $\frac{1}{2}$  grain) each, and containing 3 milligrams ( $\frac{1}{20}$  grain) of extract of nux vomica.

*Dose*.—1 or 4 pills.

*NOTE*.—These pills have approximately the same composition as many of the so-called "Little Liver Pills."

## PILULÆ ALOINI ET STRYCHNINÆ COMPOSITÆ.

COMPOUND ALOIN AND STRYCHNINE PILLS.

	In 100 parts	In 1 pill about
Aloin ... ..	50.00	$\frac{1}{5}$ grain
Strychnine ... ..	5.00	$\frac{1}{50}$ grain
Green Extract of Belladonna ...	25.00	$\frac{1}{10}$ grain
Ipecacuanha, in powder ... ..	12.50	$\frac{1}{20}$ grain

Milk Sugar, a sufficient quantity,

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing about 3 centigrams ( $\frac{1}{2}$  grain) each, and containing 1.2 milligrams ( $\frac{1}{50}$  grain) of strychnine.

*Dose*.—1 or 2 pills.

*NOTE*.—*Pilulæ Laxativæ Compositæ*, U.S.P., are prepared by massing 1.3 grammes of aloin, 5 centigrams of strychnine, 4 decigrams of powdered ipecacuanha, and 4.6 grammes of powdered liquorice with 8 decigrams of extract of belladonna leaves and a sufficient quantity of syrup to form a mass which is divided into 100 pills.

## PILULÆ ASAFETIDÆ.

ASAFETIDA PILLS.

*Synonym*.—*Pilulæ Asafoetidæ*.

	In 100 parts	In 1 pill about
Asafetida ... ..	70.00	3 grains.
Hard Soap ... ..	21.00	

Distilled Water, a sufficient quantity.

Mix to form a mass and divide into pills weighing about  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose*.—1 or 2 pills.

## PILULÆ ASIATICÆ.

ASIATIC PILLS.

	In 100 parts	In 1 pill about
Arsenious Anhydride ... ..	6.25	$\frac{1}{16}$ grain
Black Pepper ... ..	75.00	$\frac{3}{4}$ grain
Extract of Gentian, sufficient to produce ... ..	100.00	

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose*.—1 pill.

**PILULÆ ATROPINÆ ET MORPHINÆ.**

## ATROPINE AND MORPHINE PILLS.

	In 100 parts	In 1 pill about
Atropine Sulphate ... ..	1.00	$\frac{1}{160}$ grain
Morphine Hydrochloride ... ..	16.00	$\frac{1}{8}$ grain
Milk Sugar, a sufficient quantity.		
Syrup of Glucose, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose.*—1 pill.

**PILULÆ CALOMELANOS ET COLOCYNTHIDIS.**

## CALOMEL AND COLOCYNTH PILLS.

	In 100 parts	In 1 pill about
Mercurous Chloride ... ..	20.00	1 grain
Compound Extract of Colocynth ...	80.00	4 grains

Mix to form a mass, and divide into pills weighing 3 decigrams (5 grains) each.

*Dose.*—1 pill.

**PILULÆ CALOMELANOS ET COLOCYNTHIDIS ET HYOSCYAMO.**

## CALOMEL, COLOCYNTH, AND HYOSCYAMUS PILLS.

*Synonym.*—Zittmann's Pills.

	In 100 parts	In 1 pill about
Mercurous Chloride ... ..	25.00	1 grain
Compound Extract of Colocynth ...	50.00	2 grains
Green Extract of Hyoscyamus ...	25.00	1 grain

Mix to form a mass and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ CAMBOGIÆ COMPOSITÆ.**

## COMPOUND GAMBOGE PILLS.

	In 100 parts	In 1 pill about
Gamboge, in powder ... ..	16.50	$\frac{1}{8}$ grain
Barbados Aloes, in powder ... ..	16.50	$\frac{1}{8}$ grain
Compound Powder of Cinnamon ...	16.50	$\frac{1}{8}$ grain
Hard Soap, in powder ... ..	33.00	$1\frac{1}{3}$ grains
Syrup of Glucose, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

## PILULÆ CASCARÆ ET BELLADONNÆ ET NUCIS VOMICÆ.

CASCARA, BELLADONNA, AND NUX VOMICA PILLS.

	In 100 parts	In 1 pill about
Extract of Cascara Sagrada ...	80.00	$\frac{4}{5}$ grain
Extract of Nux Vomica ...	10.00	$\frac{1}{10}$ grain
Alcoholic Extract of Belladonna ...	10.00	$\frac{1}{10}$ grain

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose.*—1 to 3 pills.

## PILULÆ CASCARÆ ET EUONYMINI.

CASCARA AND EUONYMIN PILLS.

	In 100 parts	In 1 pill about
Extract of Cascara Sagrada ...	50.00	$\frac{1}{2}$ grain
Euonymin ...	25.00	$\frac{1}{4}$ grain
Green Extract of Hyoscyamus ...	25.00	$\frac{1}{4}$ grain

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose.*—1 to 4 pills.

## PILULÆ CATHARTICÆ COMPOSITÆ.

COMPOUND CATHARTIC PILLS.

	In 100 parts	In 1 pill about
Compound Extract of Colocynth ...	44.00	$1\frac{1}{3}$ grains
Mercurous Chloride ...	33.00	1 grain
Jalap Resin ...	11.00	$\frac{1}{3}$ grain
Gamboge ...	8.25	$\frac{1}{4}$ grain

Alcohol (45 per cent.), a sufficient quantity.

Mix the powders, add sufficient alcohol to form a mass, and divide into pills weighing about 2 decigrams (3 grains) each.

*Dose.*—1 or 2 pills.

NOTES.—These pills correspond to *Pilulæ Catharticæ Compositæ*, U.S.P., except as regards the difference in the composition of the compound extract of colocynth. *Pilulæ Catharticæ Vegetabiles*, U.S.P., are prepared by mixing 60 of compound extract of colocynth, 15 of podophyllum resin, 20 of jalap resin, 15 of extract of leptandra, and 8 of oil of peppermint, then adding 30 of extract of hyoscyamus with sufficient 49 per cent. alcohol to make a mass.

## PILULÆ COLCHICI ET ALOES.

COLCHICUM AND ALOES PILLS.

	In 100 parts	In 1 pill about
Acetic Extract of Colchicum ...	25.00	$\frac{1}{4}$ grain
Extract of Barbados Aloes ...	25.00	$\frac{1}{4}$ grain
Green Extract of Hyoscyamus ...	25.00	$\frac{1}{4}$ grain

Compound Powder of Acacia, a sufficient quantity.

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose.*—1 to 4 pills.



**PILULÆ COLCHICI ET HYDRARGYRI.****COLCHICUM AND MERCURY PILLS.**

	In 100 parts	In 1 pill about
Acetic Extract of Colchicum ...	15·00	$\frac{1}{6}$ grain
Mercury Pill Mass ... ..	30·00	$\frac{1}{3}$ grain
Compound Extract of Colocynth ...	55·00	$\frac{1}{2}$ grain

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose.*—1 to 3 pills.

**PILULÆ COLCHICI ET HYDRARGYRI COMPOSITÆ.****COMPOUND COLCHICUM AND MERCURY PILLS.**

*Synonym.*—Sir Benjamin Brodie's Gout Pills.

	In 100 parts	In 1 pill about
Acetic Extract of Colchicum ...	11·00	0·44 grain
Mercury Pill Mass ... ..	29·50	1·18 grains
Compound Extract of Colocynth ...	29·50	1·18 grains
Extract of Rhubarb ... ..	30·00	1·20 grains

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ COLOCYNTHIDIS COMPOSITÆ.****COMPOUND COLOCYNTH PILLS.**

*Synonym.*—Dr. Gregory's Pills.

	In 100 parts	In 1 pill about
Colocynth Pulp, in powder ...	18·00	$\frac{3}{4}$ grain
Barbados Aloes, in powder ...	36·00	$1\frac{1}{2}$ grains
Scammony Resin, in powder ...	36·00	$1\frac{1}{2}$ grains
Potassium Sulphate, in fine powder	4·50	$\frac{1}{5}$ grain
Oil of Cloves ... ..	4·50	$\frac{1}{5}$ minim

Distilled Water, a sufficient quantity.

Mix the colocynth pulp with the oil previously triturated with the potassium sulphate; add the aloes and resin, mix intimately, and use sufficient water to form a mass. Divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

*NOTE.*—Pills produced by a variant of this formula are known as Alexander's Liver Pills.

**PILULÆ COLOCYNTHIDIS ET HYDRARGYRI.****COLOCYNTH AND MERCURY PILLS.**

*Synonym.*—Abernethy's Pills.

	In 100 parts	In 1 pill about
Compound Extract of Colocynth ...	60·00	3·00 grains
Mercury Pill Mass ... ..	40·00	2·00 grains

Mix to form a mass, and divide into pills weighing 3 decigrams (5 grains) each.

*Dose.*—1 or 2 pills.

## PILULÆ COLOCYNTHIDIS ET HYDRARGYRI COMPOSITÆ.

### COMPOUND COLOCYNTH AND MERCURY PILLS.

	In 100 parts	In 1 pill about
Compound Colocynth Pill Mass ...	50.00	$\frac{1}{2}$ grain
Mercury Pill Mass ... ..	25.00	$\frac{1}{4}$ grain
Green Extract of Hyoscyamus ...	25.00	$\frac{1}{4}$ grain

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose.*—1 to 4 pills.

## PILULÆ COLOCYNTHIDIS ET HYOSCYAMI.

### COLOCYNTH AND HYOSCYAMUS PILLS.

	In 100 parts	In 1 pill about
Compound Colocynth Pill Mass ...	66.00	$2\frac{2}{3}$ grains
Green Extract of Hyoscyamus ...	33.00	$1\frac{1}{3}$ grains

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTES.—Christison's Pills contain each 2 grains of this pill mass; Hamilton's Pills contain compound extract of colocynth instead of compound colocynth pill mass, and 90 grains of the mass is divided into 24 pills.

## PILULÆ CONII COMPOSITÆ.

### COMPOUND CONIUM PILLS.

*Synonym.*—Compound Hemlock Pills.

	In 100 parts	In 1 pill about
Extract of Conium ... ..	75.00	$2\frac{1}{2}$ grains
Ipecacuanha Root, in powder ...	15.00	$\frac{1}{2}$ grain

Treacle, a sufficient quantity.

Mix the extract with the ipecacuanha, add sufficient treacle to form a mass, and divide into pills weighing about  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

## PILULÆ CREOSOTI.

### CREOSOTE PILLS.

	In 100 parts	In 1 pill about
Creosote ... ..	25.00	1 minim
Curd Soap, in powder ... ..	12.50	$\frac{1}{2}$ grain
Liquorice Root, in powder ... ..	62.50	$2\frac{1}{2}$ grains

Mix to form a mass, and divide into pills weighing about  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 pill.

**PILULÆ DAMIANÆ COMPOSITÆ.**

## COMPOUND DAMIANA PILLS.

	In 100 parts	In 1 pill about
Extract of Damiana ... ..	80·00	2·0 grains
Extract of Nux Vomica ... ..	4·00	0·10 grain
Phosphorated Suet ... ..	4·00	0·10 grain
Chloroform ... ..	9·00	
Compound Powder of Tragacanth	4·00	
Mucilage of Acacia, a sufficient quantity.		

Mix together "quickly" the phosphorated suet, extracts, and chloroform; then add the compound powder of tragacanth and sufficient mucilage of acacia to form a pill mass. Divide into pills weighing 2 decigrams (3 grains) each.

*Dose.*—1 pill, twice or thrice daily.

**PILULÆ DIGITALIS COMPOSITÆ.**

## COMPOUND DIGITALIS PILLS.

*Synonyms.*—Pilulæ Digitalis cum Scilla; Guy's Pills.

	In 100 parts	In 1 pill about
Digitalis Leaves, in powder ... ..	30·00	1 grain
Squill, in powder ... ..	30·00	1 grain
Mercury Pill Mass ... ..	30·00	1 grain
Syrup of Glucose, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing about  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTE.—Baillie's or Gilmour's Pills contain twice as much squill as is specified in the above formula.

**PILULÆ DIGITALIS ET OPII COMPOSITÆ.**

## COMPOUND DIGITALIS AND OPIUM PILLS.

*Synonym.*—Dr. Heim's Pills.

	In 100 parts	In 1 pill about
Digitalis Leaves, in powder ... ..	24·00	0·50 grain
Opium, in powder ... ..	12·00	0·25 grain
Ipecacuanha Root, in powder ... ..	12·00	0·25 grain
Quinine Sulphate ... ..	48·00	1·00 grain
Syrup of Glucose, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing 12 centigrams (2 grains) each.

*Dose.*—1 or 2 pills.



**PILULÆ FERRI.**

## IRON PILLS.

*Synonym.*—Blaud's Pills.

	In 100 parts	In 1 pill about
Exsiccated Ferrous Sulphate, in fine powder ... ..	30·00	1 grain of $\text{FeCO}_3$
Exsiccated Sodium Carbonate, in fine powder ... ..	19·00	0·95 grain
Gum Acacia, in powder ... ..	10·00	0·50 grain,
Tragacanth, in powder ... ..	3·00	0·15 grain
Syrup ... ..	30·00	1·50 grain
Glycerin ... ..	2·00	0·10 grain

Distilled Water, a sufficient quantity.

Add the ferrous sulphate to the syrup, glycerin, and water, previously mixed; add quickly the sodium carbonate, mix and set aside for fifteen minutes, or until the reaction is complete; then thoroughly incorporate the acacia and tragacanth. Divide into pills weighing 3 decigrams (5 grains) each.

*Dose.*—1 to 3 pills.

NOTES.—Iron pills contain about 20 per cent. of ferrous carbonate. A more satisfactory result is obtained by substituting 30 of liquid glucose for the syrup and glycerin, and using 6 of distilled water, since the ferrous carbonate does not become oxidised on keeping (a fact attributed to the reducing action of the glucose), and the product is of better consistence than the official pill mass. Add the distilled water to the glucose, then add the ferrous sulphate, and mix. Next add the sodium carbonate quickly, mix, and set aside for ten minutes, or until the reaction is complete. Finally, add the gum acacia and tragacanth, and incorporate thoroughly. *Pilulæ Ferri Carbonatis*, U.S.P., are prepared with 16 of granulated ferrous sulphate, 8 of potassium carbonate, 4 of sugar, 1 of tragacanth in fine powder, 1 of althæa in No. 60 powder, and a sufficient quantity of glycerin and water.

**PILULÆ FERRI CARBONATIS.**

## FERROUS CARBONATE PILLS.

*Synonym.*—Carbonate of Iron Pills.

	In 100 parts	In 1 pill about
Ferrous Carbonate with Glucose ... ..	64·80	1 to 3 grains
Liquorice Root, in fine powder ... ..	16·20	
Liquid Glucose ... ..	21·60	
Distilled Water ... ..	5·40	

Mix to form a mass, and divide into pills weighing each 15, 30, or 45 centigrams ( $2\frac{1}{2}$ , 5, or  $7\frac{1}{2}$  grains), those of the smallest size being equivalent to 5-grain Blaud's pills.

*Dose.*—1 or more pills, according to size.

NOTES.—*Pilula Ferri Carbonatis*, B.P. 1885, was prepared by mixing saccharated carbonate of iron with one-fourth its weight of confection of roses. Dose, 3 to 12 decigrams (5 to 20 grains). *Pilulæ Ferri Carbonatis*, U.S.P., corresponds to *Pilulæ Ferri*. *Massa Ferri Carbonatis*, U.S.P., is prepared by mixing 20 of syrup with a solution of 100 of ferrous sulphate in boiling distilled water, adding the mixture gradually to a solution of 46 of monohydrated sodium carbonate in

boiling distilled water, washing the precipitated ferrous carbonate with diluted syrup, mixing it with 38 of clarified honey, and 25 of sugar in coarse powder, and evaporating the mixture until it is reduced to 100 by weight. The average dose of this mass of ferrous carbonate (Vallet's Mass) is  $2\frac{1}{2}$  decigrams (4 grains).

### PILULÆ FERRI ET ARSENICI.

#### IRON AND ARSENIC PILLS.

*Synonym.*—Pilulæ Ferri Arsenicalis.

	In 100 parts	In 1 pill about
Exsiccated Ferrous Sulphate ...	90·00	3 grains
Arsenious Acid ... ..	0·60	$\frac{1}{50}$ grain
Milk Sugar, a sufficient quantity.		
Syrup of Glucose, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

### PILULÆ FERRI IODIDI.

#### IODIDE OF IRON PILLS.

	In 100 parts	In 1 pill about
Iron, in wire ... ..	10·50	1 grain
Iodine ... ..	21·00	of $\text{FeI}_2$
Refined Sugar, in powder ...	19·00	
Liquorice Root, in powder ...	37·50	
Distilled Water ... ..	12·00	

Shake the iron with the iodine and water in a vessel of a suitable size, until the froth becomes white; then pour the solution upon the sugar in a mortar, triturate briskly, and gradually add the liquorice. Divide the mass into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTES.—Pilula Ferri Iodidum was official in the British Pharmacopœia, 1885. Pilulæ Ferri Iodidi, U.S.P., are prepared in a similar way with 4 of reduced iron, 5 of iodine, 4 of liquorice in No. 60 powder, 4 of sugar in fine powder, 1 of extract of liquorice in fine powder, 1 of gum acacia in fine powder, and a sufficient quantity of water; the finished pills are coated with a solution of balsam of tolu in ether.

### PILULÆ FERRI ET QUININÆ ET NUCIS VOMICÆ.

#### IRON, QUININE, AND NUX VOMICA PILLS.

	In 100 parts	In 1 pill about
Exsiccated Ferrous Sulphate ...	60·00	$1\frac{1}{2}$ grains
Quinine Sulphate ... ..	30·00	$\frac{3}{4}$ grain
Extract of Nux Vomica ... ..	6·00	$\frac{3}{20}$ grain
Milk Sugar, a sufficient quantity.		
Syrup of Glucose, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing 2 decigrams (3 grains) each.

*Dose.*—1 or 2 pills.

# **PILULÆ FERRI PHOSPHATIS CUM QUININÆ ET STRYCHNINA.**

IRON PHOSPHATE PILLS WITH QUININE AND STRYCHNINE.

*Synonyms.*—Pilulæ Trium Phosphatum; Easton's Pills; Pilulæ Ferri et Quininæ et Strychninæ Phosphatum.

	In 100 parts	In 1 pill about
Ferrous Phosphate ... ..	20·00	1 grain
Quinine Sulphate ... ..	20·00	1 grain
Strychnine ... ..	0·62	$\frac{1}{32}$ grain

Milk Sugar, a sufficient quantity.

Concentrated Phosphoric Acid, a sufficient quantity.

Triturate the strychnine with the milk sugar, and mix quickly with the other ingredients to form a mass. Divide into pills weighing  $12\frac{1}{2}$  centigrams (2 grains) each.

*Dose.*—1 or 2 pills.

*NOTE.*—Easton's pills are sometimes made twice the size specified above, and they may be ordered with the addition of  $\frac{1}{84}$  grain (1 milligram) of arsenious acid.

# **PILULÆ FERRI VALERIANATIS COMPOSITÆ.**

COMPOUND VALERIANATE OF IRON PILLS.

*Synonym.*—Pilulæ Trium Valerianatum.

	In 100 parts	In 1 pill about
Iron Valerianate ... ..	30·00	1 grain
Quinine Valerianate ... ..	30·00	1 grain
Zinc Valerianate ... ..	30·00	1 grain

Milk Sugar, a sufficient quantity.

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

# **PILULÆ GALBANI COMPOSITÆ.**

COMPOUND GALBANUM PILLS.

*Synonym.*—Compound Asafetida Pills.

	In 100 parts	In 1 pill about
Asafetida ... ..	28·50	$1\frac{1}{8}$ grains
Galbanum ... ..	28·50	$1\frac{1}{8}$ grains
Myrrh ... ..	28·50	$1\frac{1}{8}$ grains

Syrup of Glucose, a sufficient quantity.

Stir together on a water-bath until the mass is of uniform consistence, and divide into pills weighing  $2\frac{1}{2}$  centigrams (4 grains) each.

*Dose.*—1 or 2 pills.



**PILULÆ HYDRARGYRI.**

MERCURY PILLS.

*Synonym.*—Blue Pills.

	In 100 parts	In 1 pill about
Mercury ... ..	33·00	1½ grains
Confection of Roses ... ..	49·5	2 grains
Liquorice Root, in fine powder ... ..	16·50	

Triturate the mercury with the confection of roses until metallic globules can no longer be seen; finally incorporate the powdered root, and divide the mass into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

NOTES.—Massa Hydrargyri, U.S.P., is prepared by triturating 33 of mercury with 33 of honey of rose until extinguished, adding 9 by weight of glycerin, then adding gradually 10 of liquorice powder and 15 of althæa powder, and making a homogeneous mass. The average dose of this mass of mercury is 25 decigrams (4 grains.)

**PILULÆ HYDRARGYRI CUM CRETA ET OPIO.**

MERCURY WITH CHALK AND OPIUM PILLS.

*Synonym.*—Hutchinson's Pills.

	In 100 parts	In 1 pill about
Mercury with Chalk ... ..	45·00	1 grain
Compound Powder of Ipecacuanha ... ..	45·00	1 grain
Milk Sugar, a sufficient quantity,		
Syrup of Glucose, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing 2 decigrams (3 grains) each.

*Dose.*—1 pill.

**PILULÆ HYDRARGYRI CUM OPIO.**

MERCURY PILLS WITH OPIUM.

	In 100 parts	In 1 pill about
Mercury Pill Mass ... ..	95·00	5 grains
Opium, in powder ... ..	5·00	¼ grain

Mix to form a mass, and divide into pills weighing 3 decigrams (5 grains) each.

*Dose.*—1 pill.

**PILULÆ HYDRARGYRI CUM RHEO.**

MERCURY PILLS WITH RHUBARB.

	In 100 parts	In 1 pill about
Mercury Pill Mass ... ..	50·00	2½ grains
Compound Rhubarb Pill Mass ... ..	50·00	2½ grains

Mix to form a mass, and divide into pills weighing 3 decigrams (5 grains) each.

*Dose.*—1 pill.

**PILULÆ HYDRARGYRI SUBCHLORIDI COMPOSITÆ.**

COMPOUND MERCUROUS CHLORIDE PILLS.

*Synonyms.*—Compound Calomel Pills; Plummer's Pills.

	In 100 parts	In 1 pill about
Mercurous Chloride ... ..	22.50	1 grain
Sulphurated Antimony ... ..	22.50	1 grain
Guaiacum Resin, in powder ... ..	45.00	2 grains
Castor Oil, by weight ... ..	9.27	$\frac{1}{3}$ grain
Alcohol, a sufficient quantity.		

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

*NOTE.*—Pills prepared by the official formula, as above, are very insoluble; they should preferably be massed with syrup of glucose in place of alcohol.

**PILULÆ IPECACUANHÆ CUM SCILLA.**

IPECACUANHA PILLS WITH SQUILL.

	In 100 parts	In 1 pill about
Compound Powder of Ipecacuanha ... ..	60.00	2 grains
Squill, in powder ... ..	20.00	$\frac{2}{3}$ grain
Ammoniacum, in powder ... ..	20.00	$\frac{2}{3}$ grain

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

*NOTE.*—These pills contain about 5 per cent. of opium.

**PILULÆ IPECACUANHÆ CUM URGINEÆ.**

IPECACUANHA PILLS WITH URGINEÆ.

	In 100 parts	In 1 pill about
Compound Powder of Ipecacuanha ... ..	60.00	2 grains
Urgineæ, dried and in powder ... ..	20.00	$\frac{2}{3}$ grain
Ammoniacum, in powder ... ..	20.00	$\frac{2}{3}$ grain

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

*NOTE.*—These pills contain about 5 per cent. of opium, and are official in India and the Eastern Colonies.

**PILULÆ JALAPÆ COMPOSITÆ.**

COMPOUND JALAP PILLS.

	In 100 parts	In 1 pill about
Barbados Aloes, in powder ... ..	48.00	2 grains
Colocynth, in powder ... ..	12.00	$\frac{1}{2}$ grain
Jalap, in powder ... ..	24.00	1 grain
Soft Soap ... ..	12.00	$\frac{1}{2}$ grain
Oleoresin of Ginger ... ..	4.00	$\frac{1}{6}$ grain

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

## PILULÆ JALAPÆ ET HYDRARGYRI SUBCHLORIDI COMPOSITÆ.

COMPOUND JALAP AND MERCUROUS CHLORIDE PILLS.

*Synonym.*—Compound Jalap and Calomel Pills.

	In 100 parts	In 1 pill about
Barbados Aloes, in powder ... ..	40'00	$1\frac{1}{2}$ grain
Colocynth, in powder ... ..	12'00	$\frac{1}{2}$ grain
Jalap, in powder ... ..	24'00	1 grain
Soft Soap ... ..	12'00	$\frac{1}{2}$ grain
Mercurous Chloride ... ..	8'00	$\frac{1}{3}$ grain
Oleoresin of Ginger ... ..	4'00	$\frac{1}{6}$ grain

· Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose.*—1 or 2 pills.

## PILULÆ PHOSPHORI.

PHOSPHORUS PILLS.

	In 100 parts	In 1 pill about
Phosphorus ... ..	2'00	$\frac{1}{50}$ grain
White Beeswax ... ..	25'00	
Lard ... ..	25'00	
Kaolin ... ..	23'00	

Carbon Bisulphide, a sufficient quantity.

Gum Acacia, in powder, a sufficient quantity.

Melt the wax and lard, place in a slightly warmed mortar and triturate until the mixture is of a creamy consistence, carefully incorporate the phosphorus previously dissolved in carbon bisulphide, 6, or a sufficient quantity; then add the kaolin and mix well together, The mass should be stored under water in a bottle excluded from the light. When dispensed the mass should be incorporated with one-third its weight of powdered gum acacia, divided into pills weighing 6 centigrams (1 grain) each, and the pills varnished.

*Dose.*—1 or 2 pills.

NOTES.—Phosphorus pills contain 2 per cent. of phosphorus. Pilulæ Phosphori, U.S.P., are prepared by dissolving 0.06 of phosphorus in 5 of chloroform, adding the solution to a mixture of 6 of powdered althæa and 3 of powdered acacia, then massing with glycerin diluted with half its volume of water; the finished pills are coated with solution of balsam of tolu in ether.

## PILULÆ PHOSPHORI COMPOSITÆ.

COMPOUND PHOSPHORUS PILLS.

	In 100 parts	In 1 pill about
Phosphorated Suet ... ..	5'00	$\frac{1}{10}$ grain
Quinine Sulphate ... ..	12'50	$\frac{1}{4}$ grain
Reduced Iron... ..	75'00	$1\frac{1}{2}$ grain
Strychnine ... ..	0'50	$\frac{1}{100}$ grain
Chloroform ... ..	10'00	
Compound Powder of Tragacanth... ..	5'00	
Mucilage of Acacia, a sufficient quantity.		



Mix together quickly the phosphorated suet, quinine sulphate, and chloroform, and add the strychnine, previously well triturated with the reduced iron, the compound powder of tragacanth, and sufficient mucilage of acacia to form a mass of pilular consistence. Divide into pills weighing 12 centigrams (2 grains) each, and let the pills be varnished.

*Dose.*—1 or 2 pills.

*NOTE.*—The chloroform in this pill mass prevents phosphorescence and oxidation.

## PILULÆ PHOSPHORI CUM QUININA.

PHOSPHORUS PILLS WITH QUININE.

	In 100 parts	In 1 pill about
Phosphorated Suet ... ..	10'00	$\frac{1}{5}$ grain
Quinine Sulphate ... ..	50'00	1 grain
Chloroform ... ..	20'00	
Compound Powder of Tragacanth...	10'00	

Mucilage of Acacia, a sufficient quantity.

Mix together quickly the phosphorated suet, quinine sulphate, and chloroform, and add the compound powder of tragacanth and sufficient mucilage of acacia to form a pill mass. Divide into pills weighing 12 centigrams (2 grains) each.

*Dose.*—1 or 2 pills.

*NOTE.*—The chloroform in this formula prevents phosphorescence and oxidation in the pill mass.

## PILULÆ PLUMBI CUM OPIO.

LEAD PILLS WITH OPIUM.

	In 100 parts	In 1 pill about
Lead Acetate, in fine powder ... ..	75'00	$1\frac{1}{2}$ grains
Opium, in fine powder ... ..	12'50	$\frac{1}{4}$ grain

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing 12 centigrams (2 grains) each.

*Dose.*—1 or 2 pills.

*NOTE.*—These pills contain about 12'5 per cent. of opium.

## PILULÆ PODOPHYLLI ET BELLADONNÆ ET NUCIS VOMICÆ.

PODOPHYLLIN, BELLADONNA, AND NUX VOMICA PILLS.

	In 100 parts	In 1 pill about
Podophyllum Resin ... ..	16'00	$\frac{1}{3}$ grain
Alcoholic Extract of Belladonna ... ..	16'00	$\frac{1}{3}$ grain
Extract of Nux Vomica ... ..	16'00	$\frac{1}{3}$ grain
Extract of Barbados Aloes ... ..	52'00	1 grain

Mix to form a mass, and divide into pills weighing 12 centigrams (2 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ PODOPHYLLI COMPOSITÆ.****COMPOUND PODOPHYLLIN PILLS.**

	In 100 parts	In 1 pill about
Podophyllum Resin ... ..	15·00	$\frac{1}{4}$ grain
Mercurous Chloride ... ..	60·00	1 grain
Alcoholic Extract of Belladonna ...	10·00	$\frac{1}{8}$ grain

Milk Sugar, a sufficient quantity.

Syrup of Glucose, a sufficient quantity.

Mix to form a mass and divide into pills weighing 12 centigrams (2 grains) each.

*Dose.*—1 pill.

NOTE.—Poore's pill contains  $\frac{1}{12}$  grain of podophyllum resin, 1 grain of quinine sulphate,  $\frac{1}{8}$  grain of alcoholic extract of belladonna, and 1 grain of extract of Socotrine aloes.

**PILULÆ QUININÆ CUM FERRO.****QUININE PILLS WITH IRON.**

	In 100 parts	In 1 pill about
Quinine Sulphate ... ..	45·00	1 grain
Æxsuccated Ferrous Sulphate ...	45·00	1 grain

Milk Sugar, a sufficient quantity.

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing 2 decigrams (3 grains) each.

*Dose.*—1 or 2 pills.

**PILULÆ QUININÆ SULPHATIS.****QUININE SULPHATE PILLS.**

	In 100 parts	In 1 pill about
Quinine Sulphate ... ..	82·50	$1\frac{2}{3}$ grains
Tartaric Acid, in powder ... ..	2·75	
Glycerin ... ..	11·00	
Tragacanth, in powder ... ..	2·75	

Mix the glycerin and tragacanth, add the mixture to the quinine sulphate, previously triturated with the acid, and beat to form a mass. Divide into pills weighing 12 centigrams (2 grains) each.

*Dose.*—1 to 4 pills.

**PILULÆ QUININÆ SULPHATIS COMPOSITÆ.****COMPOUND QUININE SULPHATE PILLS.**

*Synonym.*—Aitkin's Tonic Pills.

	In 100 parts.	In 1 pill about.
Quinine Sulphate ... ..	50·00	$\frac{1}{2}$ grain
Reduced Iron ... ..	33·00	$\frac{1}{3}$ grain
Arsenious Anhydride ... ..	1·00	$\frac{1}{100}$ grain
Strychnine ... ..	1·00	$\frac{1}{100}$ grain

Extract of Gentian, a sufficient quantity.

Mix to form a mass, and divide into pills weighing 6 centigrams (1 grain) each.

*Dose.*—1 or 2 pills.

**PILULÆ RHEI ET COLOCYNTHIDIS ET HYDRARGYRI.**

RHUBARB, COLOCYNTH, AND MERCURY PILLS.

	In 100 parts	In 1 pill about
Compound Rhubarb Pill ... ..	40·00	1 grain
Compound Colocynth Pill ... ..	40·00	1 grain
Mercury Pill ... ..	20·00	$\frac{1}{2}$ grain

Mix to form a mass, and divide into pills weighing 15 centigrams ( $2\frac{1}{2}$  grains) each.

*Dosè.*—1 or 2 pills.

**PILULÆ RHEI COMPOSITÆ.**

COMPOUND RHUBARB PILLS.

	In 100 parts	In 1 pill about
Rhubarb Root, in powder ... ..	27·00	1 grain
Socotrine Aloes, in powder ... ..	20·25	$\frac{4}{5}$ grain
Myrrh, in powder ... ..	13·50	$\frac{1}{2}$ grain
Hard Soap, in powder ... ..	13·50	$\frac{1}{2}$ grain
Oil of Peppermint ... ..	1·69	$\frac{1}{16}$ minim

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dosè.*—1 or 2 pills.

NOTE.—Pilulæ Rhei Compositæ, U.S.P., are prepared by massing 13 of powdered rhubarb, 10 of purified aloes, 6 of powdered myrrh, and 0·5 of oil of peppermint with water.

**PILULÆ RHEI ET NUCIS VOMICÆ.**

RHUBARB AND NUX VOMICA PILLS.

	In 100 parts	In 1 pill about
Compound Rhubarb Pill ... ..	85·00	$2\frac{1}{8}$ grains
Extract of Nux Vomica ... ..	10·00	$\frac{1}{4}$ grain
Alcoholic Extract of Belladonna ... ..	5·00	$\frac{1}{8}$ grain

Milk Sugar, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dosè.*—1 pill.

**PILULÆ SAPONIS COMPOSITÆ.**

COMPOUND SOAP PILLS.

*Synonyms.*—Pilulæ Opii; Opium Pills.

	In 100 parts	In 1 pill about
Opium, in powder ... ..	20·00	$\frac{2}{5}$ grain
Hard Soap, in powder ... ..	60·00	$1\frac{1}{5}$ grain
Syrup of Glucose ... ..	20·00	

Mix to form a mass, and divide into pills weighing 12 centigrams (2 grains) each.

Compound soap pills contain 20 per cent. of opium.

*Dosè.*—1 or 2 pills.



NOTE.—*Pilulæ Opii*, U.S.P. are prepared by massing  $6\frac{1}{2}$  grammes of powdered opium and 2 grammes of powdered hard soap with water, and dividing the mass into 100 pills.

### PILULÆ SCAMMONII COMPOSITÆ.

#### COMPOUND SCAMMONY PILLS.

	In 100 parts	In 1 pill about
Scammony Resin ... ..	32·00	$1\frac{1}{3}$ grains
Jalap Resin ... ..	32·00	$1\frac{1}{3}$ grains
Curd Soap, in powder ... ..	32·00	$1\frac{1}{3}$ grains
Tincture of Ginger ... ..	96·00	

Mix together the tincture, soap, and resins; dissolve by the aid of a gentle heat, and evaporate on a water-bath until the product is of a pilular consistence. Divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose*.—1 or 2 pills.

NOTES.—The tincture of ginger in this formula might, with advantage, be replaced by 4 per cent. of oleoresin of ginger.

### PILULÆ SCILLÆ COMPOSITÆ.

#### COMPOUND SQUILL PILLS.

	In 100 parts	In 1 pill about
Squill, in powder ... ..	25·00	1 grain
Ginger, in powder ... ..	20·00	$\frac{3}{4}$ grain
Ammoniacum, in powder ... ..	20·00	$\frac{3}{4}$ grain
Hard Soap, in powder ... ..	20·00	$\frac{3}{4}$ grain

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

*Dose*.—1 or 2 pills.

### PILULÆ URGINEÆ COMPOSITÆ.

#### COMPOUND URGINEA PILLS.

	In 100 parts	In 1 pill about
Urginea, dried, and in powder ... ..	25·00	1 grain
Ginger, in powder ... ..	20·00	$\frac{3}{4}$ grain
Ammoniacum, in powder ... ..	20·00	$\frac{3}{4}$ grain
Hard Soap, in powder ... ..	20·00	$\frac{3}{4}$ grain

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.

Compound urguinea pills are official in India and the Eastern Colonies.

*Dose*.—1 or 2 pills.

**PILULÆ ZINCI OXIDI ET BELLADONNÆ.****ZINC OXIDE AND BELLADONNA PILLS.**

	In 100 parts	In 1 pill about
Zinc Oxide ... ..	80·00	2 grains
Alcoholic Extract of Belladonna ...	10·00	$\frac{1}{4}$ grain

Milk Sugar, a sufficient quantity.

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing 2 decigrams (3 grains) each.

*Dose.*—1 pill.**PILULÆ ZINCI VALERIANATIS COMPOSITÆ.****COMPOUND ZINC VALERIANATE PILLS.**

	In 100 parts	In 1 pill about
Zinc Valerianate ... ..	45·00	1 grain
Compound Asafetida Pill ... ..	45·00	2 grains

Milk Sugar, a sufficient quantity.

Syrup of Glucose, a sufficient quantity.

Mix to form a mass, and divide into pills weighing  $2\frac{1}{2}$  decigrams (4 grains) each.*Dose.*—1 or 2 pills.**PIMENTA.****PIMENTO.***Synonyms.*—Allspice ; Jamaica Pepper.

Pimento is the dried, full-grown, but unripe fruit of *Pimenta officinalis*, Lindl. (N.O. Myrtaceæ), a tree indigenous to the West Indies, and cultivated in Jamaica and other islands. The green colour of the fresh fruits changes on drying to reddish-brown.

The fruits are small, nearly globular berries, about 5 to 8 millimetres in diameter. They are reddish-brown in colour, and have a rough and brittle pericarp, crowned by the remains of the calyx, surrounding the short style. The fruit is two-celled, each cell containing a single brownish-black reniform seed. The odour and taste are aromatic, bearing some resemblance to those of cloves.

The chief constituent of pimento is from 3 to 4·5 per cent. of volatile oil, consisting chiefly of eugenol ; it also contains tannin. On incineration the fruits yield from 2·5 to 5 per cent. of ash.

Pimento is an aromatic stimulant and carminative to the gastrointestinal tract, resembling cloves in its action. The oil is given on sugar, or in pills, to correct the griping tendencies of purgatives. Aqua Pimentæ is used as a vehicle for stomachic and purgative medicines.

*Dose.*— $\frac{1}{2}$  to  $1\frac{1}{2}$  grammes (8 to 24 grains).

**NOTES.**—If the fruits are collected when nearly ripe the colour becomes almost black on drying. Such fruits can be made more attractive by colouring them with bole or brown ochre, a sophistication which may be detected by boiling for a few seconds with diluted hydrochloric acid, filtering, and testing with potassium ferrocyanide ; the liquid should assume at most a bluish-green colour.

**PINI CANADENSIS CORTEX.****HEMLOCK SPRUCE BARK.**

Hemlock spruce bark is obtained from the trunk and branches of *Tsuga canadensis*, Carr (*Pinus canadensis*, Linn.), (N.O. Coniferae), a large tree indigenous to eastern North America, from which most of the outer bark has been removed.

The dried bark occurs in pieces of varying size about 5 millimetres thick. The outer surface is usually composed of the remains of the outer bark, and is often of a dull pinkish colour; inner surface striated and yellowish-brown. Fracture fibrous, a smoothed section exhibiting under the lens numerous, scattered groups of sclerenchymatous cells. Odour slight, taste strongly astringent.

The chief constituent of hemlock spruce bark is from 8 to 15 per cent. of tannin, but the bark also contains a little resin and volatile oil. The tannin appears to be identical with that of oak bark, and an extract of the bark is used in tanning. A substance resembling Burgundy pitch, which exudes from the trunk and hardens on the bark, is known as hemlock or Canada pitch, and used for similar purposes, having rubefacient properties. It is separated from the bark by boiling with water, and consists of resin with a trace of volatile oil. Hemlock or spruce needle oil contains l-pinene, l-bornyl acetate, and some sesquiterpenes.

Hemlock spruce bark is used as an astringent in catarrhal diseases of the mucous membranes. A liquid extract is prepared, which is employed as an injection in leucorrhœa, and is given internally in diarrhœa, hæmoptysis, etc.

**PIPER LONGUM.****LONG PEPPER.**

Long pepper is the dried, unripe fructification of *Piper officinarum*, C. DC. (N.O. Piperaceæ), or of *P. longum*, Linn., the former indigenous to the Malay Archipelago, the latter to Bengal and the Philippine Islands. Commercial long pepper is obtained from Java *viâ* Singapore, and is the fruit of *P. officinarum*.

It consists of a dense spike about 35 millimetres long and 5 millimetres thick, composed of large numbers of minute fruits, which, together with the bracts that support them, are embedded in the elongated axis, the whole being covered with greyish dust. A transverse section shows about eight or ten radially divergent fruits, each containing a single seed with reddish-brown testa and copious, white, starchy perisperm. Taste and odour like those of black pepper, but not so strong. The fruit of *P. longum* is similar to that of *P. officinarum*, but it is only about two-thirds as long.

The chief constituents of long pepper are about 1 per cent. of volatile oil, and 6 per cent. piperine; other constituents are a pungent resin, starch, etc.

Long pepper is employed as a stimulant and carminative, its properties residing principally in the volatile oil and resin. For medicinal preparations black pepper is usually preferred.

*Dose.*—3 to 6 decigrams (5 to 10 grains).



## PIPER NIGRUM.

BLACK PEPPER.

*Synonyms.*—Piper; Pepper.

Black pepper is the dried, unripe fruit of *Piper nigrum*, Linn. (N.O. Piperaceæ), a climbing plant indigenous to South India, and cultivated there, as well as in the islands of the Malay Archipelago, the Malay Peninsula, Siam, etc. The plant produces a pendulous spike of sessile fruits, which is collected as soon as the lower fruits change in colour from green to red and dried. The fruits are then separated from the stalks and graded to size for exportation.

The fruits are spherical, dark brown, inferior, and about 5 millimetres in diameter. The surface is deeply and coarsely reticulately wrinkled; at the apex the remains of the sessile stigma are visible. The pericarp is thin, and contains a single seed, completely filling the cavity, and often hollow in the centre. A vertical section of the fruit shows a thin, narrow, dark pericarp, within which is the whitish kernel of the seed, to which the pericarp firmly adheres. The kernel consists almost entirely of perisperm, the small endosperm surrounding the minute embryo at the apex of the fruit. The odour is aromatic, and the taste pungent.

The chief constituents of black pepper are a crystalline alkaloid, piperine (5 to 8·25 per cent.), volatile oil (1 to 2·3 per cent.), and a pungent resin sometimes called chavicin, of which little definite is known. The volatile oil (specific gravity, 0·870 to 0·900; rotation,  $-5\cdot2$  to  $+2\cdot27$ ) consists almost entirely of terpenes, amongst which 1-phellandrene has been identified. The drug yields on incineration from 4 to 7 per cent. of ash.

Black pepper has in a high degree the stimulating and carminative properties of the volatile oils, causing a reflex flow of saliva, with increased secretion of gastric juice and improved appetite. Gastro-intestinal movements are augmented, with consequent eructation of gas and relief of colic. In sufficient doses the peppers dilate the superficial vessels of the skin, causing a feeling of warmth, followed by diaphoresis and some reduction of temperature. On account of these properties they are much employed as condiments, especially in hot countries. Pepper is a diuretic, and is sometimes used in place of cubebs in gonorrhœa and urethritis, but is apt to irritate. It is also used for hæmorrhoids. An oleoresin of pepper is prepared by extraction with acetone and separation from piperine. It is suitable for use in pill form. Black pepper is used as *Confectio Piperis* often with confection of senna as a stimulating laxative in hæmorrhoids, anal fissure, etc. In conjunction with opium and other carminatives it is employed as *Pulvis Opii Compositus*.

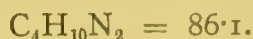
*Dose.*—3 to 6 decigrams (5 to 10 grains).

*Notes.*—White pepper is obtained from ripe fruits by soaking them in water, of heaping them and allowing them to ferment and subsequently depriving them or the outer portion of the pericarp by rubbing between the hands or trampling with the feet. By this means that portion of the pericarp exterior to the fibro-

vascular bundles that traverse the fruit from base to apex is removed. The fruits are then dried. White pepper is greyish-white in colour and exhibits vertical lines (fibrovascular bundles); it contains less piperine than black pepper, and is less pungent.

## PIPERAZINA.

### PIPERAZINE.



*Synonyms.* — Diethylene-diamine; Piperazidine; Ethylenimine; Dispermin; Hexahydropyrazine.

Piperazine,  $(\text{C}_2\text{H}_4\text{NH})_2$ , is an organic base closely allied to the natural alkaloids. It may be prepared by the action of ammonia on ethylene bromide or chloride.

It occurs in the form of colourless, glassy, lustrous tables, deliquescent, absorbing carbon dioxide from the air and forming the carbonate, having a strongly alkaline reaction, saline taste, and a faint but characteristic odour. Readily soluble in water, somewhat less so in alcohol, its aqueous solution readily decomposes. Melting-point,  $104^\circ$  to  $107^\circ$  (after drying over quicklime). It is apparently volatile at ordinary temperatures, since it forms a cloud on being brought near the vapour of hydrochloric acid. It boils at  $145^\circ$ , without decomposition, and sublimes without leaving any residue (absence of inorganic impurities). Piperazine is a strong base forming crystalline salts with acids; it also forms a hydrate  $(6\text{H}_2\text{O})$ , which melts at  $44^\circ$ . It is unaffected by solution of chromic acid, or fuming sulphuric acid even if heated to  $110^\circ$ , but potassium permanganate gradually oxidises it in the cold. Its aqueous solution yields with solution of mercuric chloride a white precipitate; with Nessler's solution a white precipitate, not reddish (absence of ammonia); with cupric sulphate a light blue precipitate, which does not, however, dissolve in excess of piperazine. Tannic acid gives a greyish precipitate easily soluble in hot water, picric acid precipitates it in the form of lemon-yellow needles soluble in hot water; the hydrochloric acid solution yields with platinum chloride a yellow precipitate which dissolves with difficulty in water and in alcohol; gold chloride in not too dilute solution gives a bright yellow precipitate of a well-crystallised double salt easily soluble in hot water; with solution of bismuth potassium iodide it gives a brick-red precipitate.

Piperazine acts as a powerful solvent of uric acid in the test-tube, dissolving twelve times as much as lithium carbonate; on this account it is prescribed to prevent or remove the deposit of uric acid in the system by forming soluble urates, which would be eliminated in the urine. It is, however, extremely doubtful whether any such solvent action is exerted in the body; the amount of piperazine appearing in the urine is very small, and it is found to be in combination with the stronger acids, and not with uric acid. A solution of piperazine 0.2 per cent. in blood serum has no solvent effect on sodium biurate, and this strength is not likely to be

exceeded or attained in the living body. Piperazine is conveniently given as Piperazinum Effervescens, or it may be given dissolved in aerated water, or in mixture form. For use in painful gout and rheumatism it is frequently prescribed with phenocoll hydrochloride or salicylate.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

NOTES.—Dimethyl-piperazine tartrate (Lycetol) and ethylene-ethenyl-diamine (Lysidine) are substances resembling piperazine in their properties. The former is a white powder, readily soluble in water; dose,  $\frac{1}{2}$  to 2 grammes (8 to 30 grains). Ethylene-ethenyl-diamine or methyl-glyoxalidin is supplied in 50 per cent. solution, the liquid being given in doses of  $\frac{1}{2}$  to 2 mls (8 to 30 minims); an acid tartrate (Lysidine Bitartrate) is a white, crystalline powder, readily soluble in water, and given in doses of 1 to 2 grammes (15 to 30 grains). Piperazine quinate (Sidonal) is similarly employed; it is a white powder, soluble in water, and is given in doses of 3 to 10 decigrams (5 to 15 grains). It must be distinguished from New Sidonal, a gout remedy, which has been stated to consist of quinic anhydride or quinic acid lactone mixed with one-third its weight of quinic acid; it is soluble in water and in alcohol, and is given in similar doses to piperazine quinate.

### PIPERAZINUM EFFERVESCENS.

#### EFFERVESCENT PIPERAZINE.

Piperazine	...	...	...	...	8.00
Sodium Bicarbonate, in powder	...	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	...	24.00
Citric Acid, in powder	...	...	...	...	16.00
Refined Sugar, in powder	...	...	...	...	16.00

Mix and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose*.—4 to 12 grammes (60 to 180 grains).

### PIPERIDINA.

#### PIPERIDINE.



*Synonym*.—Hexahydropyridine.

Piperidine,  $\text{C}_5\text{H}_{11}\text{N}$ , is prepared by the dry distillation of piperine, the alkaloid of pepper, with soda lime, or synthetically by the reduction of pyridine in alcoholic solution with sodium amalgam, this latter method being a commercial process.

It occurs as a colourless, limpid liquid, having an ammoniacal and peppery odour and a burning, caustic taste—bitter when largely diluted—and with a strong alkaline reaction. Soluble in all proportions of water and alcohol. Specific gravity, 0.876. Boiling-point,  $106^\circ$ , at which temperature it distils unchanged. It is a powerful base, and yields crystalline salts with acids. With metallic salts it reacts like ammonium hydroxide, but in the case of zinc and copper it does not redissolve the precipitated hydroxides.

Piperidine has a weak coniine-like action, but is rarely used in medicine. The acid tartrate and salicylate are given in gout and rheumatism, in doses of 6 to 10 decigrams (10 to 15 grains), on the mistaken assumption that they act as uric acid solvents. The salts are



readily soluble in water, and are dispensed in mixture form or in cachets. Piperidine guaiacolate, a compound of piperidine and guaiacol, has been recommended for use in phthisis, in doses of 3 to 20 decigrams—5 to 30 grains. It has a faint odour of guaiacol, is soluble in water, and is decomposed both by acids and alkalies.

### PIPERIDINÆ TARTRAS.

#### PIPERIDINE TARTRATE.



*Synonym.*—Piperidine Acid Tartrate.

Piperidine tartrate,  $\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NHCH}_2(\text{CHOH})_2(\text{COOH})_2$ , is the acid tartrate of piperidine.

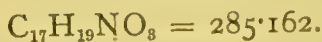
It occurs in the form of a colourless, crystalline powder having a faint odour and a pleasant taste. Readily soluble in water.

Piperidine tartrate is employed as a uric acid solvent, and has been supposed to be more effective than piperazine, but both substances are now generally regarded as valueless for this purpose. The tartrate is dispensed in cachets or mixtures.

*Dose.*—6 to 10 decigrams (10 to 15 grains).

### PIPERINA.

#### PIPERINE.



*Synonym.*—Piperyl-piperidine.

Piperine,  $\text{C}_{17}\text{H}_{19}\text{NO}_8$ , is an alkaloid obtained from *Piper nigrum*, Linn., and other plants belonging to the N.O. Piperaceæ.

It occurs in the form of colourless or slightly yellowish, glistening, prismatic crystals, odourless, tasteless at first, but later developing pungency. Almost insoluble in water; soluble in alcohol (1 in 30); in boiling alcohol (1 in 1); in ether, chloroform, benzol, hot glacial acetic acid, and volatile oils. The alcoholic solution is neutral to litmus paper, and has a peppery taste. Optically inactive. Melting-point,  $130^\circ$ . On ignition it emits alkaline vapours and burns without leaving any residue. It is a very weak base, and its salts are decomposed by water. By dry distillation with soda lime piperidine is obtained. Concentrated sulphuric acid dissolves it with the formation of a blood-red colour, which disappears on dilution with water. This is said to be a delicate reaction. Heated with alcoholic potassium hydroxide, it is converted into piperic acid and piperidine, the latter recognised by its peppery odour, the former by its melting-point of  $215^\circ$ . On adding a crystal of piperine to sulphuric acid containing about half its volume of formaldehyde solution, a permanently green liquid is formed. On heating with nitric acid, it is coloured first orange, then red, the acid acquiring a yellow colour, deepening to reddish as the crystals dissolve. The addition of an

excess of potassium hydroxide solution produces a yellow colouration, which becomes blood-red on boiling.

Piperine is employed as an antipyretic and antiperiodic in malarial conditions, and as a carminative in dyspepsia. For its action as a febrifuge, doses of 6 decigrams (8 grains) are given in a cachet or suspended in water. As a stomachic it is given in small doses in pills, sometimes with rhubarb, nux vomica, etc.

*Dose*.—1 to 6 decigrams (2 to 8 grains).

## PISCIDIA.

PISCIDIA.

*Synonym*.—Jamaica Dogwood.

Piscidia is the root bark of *Piscidia erythrina* (N.O. Leguminosæ), a shrub found in South America and the West Indies, where it is used as a fish poison.

The bark occurs in quills or curved pieces, from 5 to 15 centimetres in length, and from 4 to 6 millimetres in thickness. It is orange-brown to dark greyish-brown externally, wrinkled with thin longitudinal and transverse ridges, and somewhat fissured. The inner surface is brownish and smooth or fibrous. The bark breaks with a tough, fibrous fracture, showing greenish patches. It has a narcotic odour, and bitter, somewhat acid taste.

The chief constituents of the bark are resin, fat, a crystallisable substance named piscidin, and a bitter glucoside which is soluble in water.

Piscidia dilates the pupil, but its action has not yet been clearly defined. It is a general sedative, and has been used for toothache, neuralgia, irritant coughs, and as an antispasmodic in asthma; also in dysmenorrhœa and nervous debility. It is best given in the form of extract and liquid extract.

## PIX BURGUNDICA.

BURGUNDY PITCH.

Burgundy pitch is a resinous exudation obtained from the stem of *Picea excelsa*, Link. (N.O. Coniferæ), and purified by melting and straining. It is obtained chiefly from Finland and the Black Forest. Incisions are made in the bark, and the exuding oleoresin is scraped out of the holes in which it has solidified, after which it is melted under water, and strained.

It is an opaque, hard, brittle, reddish or yellowish-brown substance, which gradually assumes the form of the vessel in which it is kept. It breaks with a clean conchoidal fracture. The odour is aromatic, taste, sweet and aromatic.

The chief constituents of the pitch are a little volatile oil and some resin, which appears to be the anhydride of pimaric acid. Burgundy pitch should be soluble in twice its weight of glacial acetic acid, and readily soluble in alcohol.

Burgundy pitch is a mild counter-irritant, and is employed in the preparation of plasters (as *Emplastrum Picis*) for application to the loins in lumbago, to the chest in pulmonary affections, and to painful rheumatic joints.

NOTES.—A factitious Burgundy pitch is prepared by melting together common pitch, resin, and turpentine, and agitating the mixture with water. Its odour differs from that of the genuine substance, and it does not form a clear solution with glacial acetic acid.

## PIX CARBONIS.

### COAL TAR.

Coal tar is a by-product in the manufacture of coal gas by the destructive distillation of bituminous coal, and is the source of the aniline colours, phenol, picric acid, etc.

It occurs as a thick, nearly black, viscid liquid or semi-liquid, with a strong, penetrating, disagreeable odour. Slightly soluble in water, to which it communicates its characteristic odour, and an alkaline reaction; non-soluble in alcohol, ether, chloroform, benzene, and volatile oils. The alkalinity of its aqueous solutions serves to distinguish coal tar from tar obtained from vegetable substances, the latter giving an acid reaction to water shaken up with it. The surface of water in contact with coal tar shows by reflected light a strong blue metallic lustre. Specific gravity, 1.120 to 1.200. On exposure to the air it gradually becomes hardened.

The following are the chief volatile constituents of coal tar, which is a very complex mixture:—Benzene,  $C_6H_6$ , occurs abundantly in the light oil or more volatile fraction of the distillation along with toluene,  $C_6H_5CH_3$ , etc., which are liquids (about 3 per cent.); naphthalene, anthracene, etc., solids (about 12 per cent.); phenol and its homologues, which are acid products (about 20 per cent.); ammonia, aniline, pyridine, acridine, etc., which are alkaline products (about 5 per cent.); thiophen,  $C_4H_4S$ , and other sulphur compounds. The non-volatile residue (about 60 per cent.) consists of pitch or asphalt, containing solid hydrocarbons, together with resinous compounds. On adding water to an alcoholic solution of coal tar most of the hydrocarbons are precipitated.

Coal tar is used for application to the skin with a stiff brush in chronic eczema and psoriasis; some absorption must occur as the urine often becomes dark, owing to oxidation of benzenoid derivatives. The antiseptic properties of coal tar are, however, more conveniently utilised as *Liquor Picis Carbonis*.

## PIX CARBONIS PRÆPARATA.

### PREPARED COAL TAR.

Prepared coal tar is obtained by heating crude coal tar in a shallow vessel to  $49^\circ$ , and maintaining the heat for one hour, the



tar being stirred frequently to drive off the ammoniacal liquor it contains.

The product is a thick, nearly black, viscid semi-liquid, which resembles crude coal tar generally in its physical characters.

Prepared coal tar is employed in the preparation of Liquor Picis Carbonis.

### PIX LIQUIDA.

#### TAR.

*Synonyms.*—Wood Tar; Stockholm Tar.

Tar is obtained by the destructive distillation of the wood of the Scotch fir, *Pinus sylvestris*, Linn. (N.O. Coniferæ), and other species of *Pinus*.

It occurs as a dark brown or blackish, semi-liquid, bituminous substance, having a strong, peculiar, empyreumatic, terebinthinate, and aromatic odour, and a bitter, pungent, empyreumatic taste. Almost insoluble in water, but the latter on agitation with it acquires a pale yellow or brownish colour, the sharp characteristic odour and taste of the tar, and an acid reaction due chiefly to the presence of acetic acid. Soluble in less than its own bulk of alcohol or chloroform, also in ether; in 4 per cent. solution of sodium or potassium hydroxide (1 in 3); slightly soluble in fixed or volatile oils; completely soluble in acetic acid of 95 per cent. (distinction from all other tars but that of beech). Specific gravity, 1.020 to 1.150. In thin layers it is transparent if free from water. On keeping for some time it separates into an under layer of granular character from minute crystallisation of pyrocatechin, resin acids, etc., and a surface layer of a syrupy consistence. On shaking with water and filtering the filtrate is acid (distinction from coal tar, which is alkaline), and is coloured red by very dilute solution of ferric chloride (distinction from birch tar, which shows a greenish colouration); with lime water it acquires a brownish-red colour. A petroleum ether extract shaken with a diluted solution of cupric acetate (1 in 1000) acquires a greenish colour (distinction from beech tar).

Tar from wood is a very complex body, its composition varying with the kind of wood and method of preparation. The chief constituents are pyrocatechin, phenol, guaiacol, cresol, creosol, methylcreosol, phlorol, toluene, xylene, naphthalene, and other hydrocarbons. The non-volatile portion is the pitch, which is a black, resinous, brittle mass, being softened by the heat of the hand, and having the odour of tar.

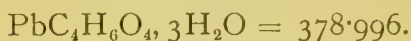
Tar is given internally as a disinfectant expectorant in chronic bronchitis and winter cough, and to allay cough in phthisis. It is also mixed with hot water and the vapour inhaled for the same purposes. Externally, tar is a stimulating antiseptic, and is employed in chronic, scaly skin diseases, especially in psoriasis and eczema. Its action in allaying pruritus is not so marked as that of coal tar. Tar is best given enclosed in gelatin capsules containing 30 centigrams (5 grains) in each. It may be made into a pill with a mixture of soap and powdered liquorice, but a large quantity of absorbent

powder is required, so that the pills are somewhat bulky. It is used also as Aqua Picis, and as Syrupus Picis Liquidæ; the latter is often given with syrup of codeine, and the mixture is extremely useful in allaying cough. For external use, Unguentum Picis is employed; this may be reduced in strength or softened if required by the addition of olive oil or lard. Tar may be used both externally and internally as Oleum Picis Liquidæ.

*Dose*.—1 to 6 decigrams (2 to 10 grains).

### PLUMBI ACETAS.

LEAD ACETATE.



*Synonyms*.—Sugar of Lead; Saccharum Saturni.

Lead acetate,  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2, 3\text{H}_2\text{O}$ , may be prepared by dissolving 1 of finely powdered lead oxide (litharge) in 2 of hot 30 per cent. acetic acid, filtering the solution while hot, and allowing it to crystallise in a cool place. On the industrial scale the salt is prepared by passing acetic acid vapour through vessels with perforated shelves on which litharge is placed.

It occurs in the form of colourless, shining, transparent, or translucent monoclinic prisms or plates, or as heavy white crystalline masses, or in a granular crystalline state, having a faint acetous odour, due to evolution of acetic acid from dissociation of the salt into free acid and a basic oxyacetate; it has a sweet metallic and astringent taste, is efflorescent, and absorbs carbon dioxide from the air. Soluble in cold water (1 in 2), in boiling water (6 in 1), in cold alcohol (1 in 20), in boiling alcohol (1 in 1), from which it crystallises with two molecules of water on cooling, and in glycerin (1 in 2). It loses its water of crystallisation over sulphuric acid, or by the action of absolute alcohol, and on heating to  $40^\circ$ . If heated rapidly to  $75^\circ$  it melts in its water of crystallisation, and at a higher temperature it is converted into basic salt, which fuses about  $280^\circ$  with continued loss of acetic acid, finally decomposing with evolution of acetone and carbon dioxide, leaving a yellow residue of finely divided metallic lead, mixed with oxide and carbonate. The aqueous solution is faintly acid owing to partial dissociation, slightly reddening litmus paper; if the water be free from carbon dioxide the solution is quite clear; slightly milky aqueous solutions are rendered clear by the addition of a little acetic acid. Perfect solubility indicates absence of sulphates and notable quantities of chlorides. A portion of the salt separates in crystalline form from concentrated aqueous solutions on the addition of strong alcohol. The addition of ether to a saturated alcoholic solution causes a separation of the salt as a crystalline powder. The salt is decomposed by the action of mineral and also some organic acids with liberation of acetic acid. A 10 per cent. aqueous solution prepared with water free from carbon dioxide should be clear, or only slightly opalescent (limit of carbonate), and should yield with solution of potassium ferrocyanide a pure white precipitate (absence of iron and copper).

If to the 10 per cent. aqueous solution hydrochloric acid be added until no further precipitate be produced, the remainder of the lead removed from the filtrate by hydrogen sulphide, and the liquid filtered, a portion of the second filtrate should not be affected by the addition of a slight excess of ammonia water (absence of zinc and iron). If another portion of the filtrate be evaporated to dryness, it should leave no residue (absence of salts of magnesium, calcium, zinc, iron, and the alkali metals). Lead acetate should be free from silver, copper, arsenium, iron, zinc, sodium, potassium, ammonium, chlorine, and nitrates.

Lead salts are chiefly used in medicine for their protective and astringent action, either on the skin, on the vaginal, urethral, and rectal mucous membranes in inflammatory conditions, or, when taken internally, to arrest diarrhoea. In all cases their astringent action is due to the formation of lead albuminate, which, in contact with mucous membranes, forms a protective coating, and prevents further penetration of the metal. On account of the formation of insoluble lead albuminate, salts of lead taken internally are absorbed with extreme slowness; nevertheless, owing to still slower excretion, cumulation may occur, and lead poisoning frequently results from the ingestion of lead in small quantities over a prolonged period. The symptoms of plumbism are anæmia, severe abdominal colic, accompanied by obstinate constipation, and often by vomiting. Examination of the gums shows a blue line on the free border, due to a deposit of lead sulphide. There may also be paralyses, of which paralysis of the extensor muscles of the fore-arm is much the commonest; this is due to peripheral interstitial neuritis. Epileptiform convulsions, optic neuritis, retinitis, and contracted granular kidney are other conditions which may be caused by chronic lead poisoning. Lead has a specific action on all muscular tissue; it excites automatic contractions in plain muscle fibres, the effect on the intestinal walls being to produce lead colic, and on the uterus to cause menorrhagia, or, if pregnant, to expel its contents. Striped muscle under the action of lead is easily exhausted, and fails to respond to stimulation, subsequently undergoing degeneration. Lead diminishes the excretion of uric acid, and is regarded as a predisposing cause of gout; it also constricts the arterioles, and has been used in the treatment of pulmonary and other forms of internal hæmorrhage. In most cases, however, the benefit obtained by the small contraction of the bleeding artery is more than counterbalanced by the very great rise in blood pressure. The treatment of chronic lead poisoning should be preventive, as well as curative. Drinks containing sulphuric acid form insoluble sulphate of lead, and potassium iodide aids in the excretion of lead from the system. But it should not be forgotten that it is possible for sufficient lead sulphate to be absorbed to cause poisonous effects. In order to render insoluble lead salts when accidentally swallowed, milk and white of egg should be given. Lead acetate is given internally in pills, massed with syrup of glucose and compound tragacanth powder, or as *Pilula*



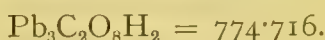
Plumbi cum Opio, in diarrhoea, dysentery, cholera, hæmoptysis, and in intestinal ulcerations of tubercular or typhoid origin. Externally, it is used for vaginal and urethral injections (1 in 250), and in soothing and astringent lotions (see also Liquor Plumbi Subacetatis). In the form of ointment it is employed as Unguentum Plumbi Acetatis for application to the skin, to allay irritation and the pain of burns and bruises, or in rectal diseases. Compound lead suppositories soothe the pain and arrest the bleeding of hæmorrhoids. Lead acetate is incompatible with carbonates, chlorides, iodides, sulphates, phosphates, and tannic acid.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

NOTE.—Solution of lead acetate is prepared by dissolving 10 of the salt in sufficient recently boiled distilled water to produce 100 by volume.

## PLUMBI CARBONAS.

LEAD CARBONATE.



*Synonyms.*—Lead Hydroxycarbonate; White Lead; Basic Lead Carbonate; Lead Subcarbonate; Cerussa.

Lead carbonate,  $(\text{PbCO}_3)_2\text{Pb}(\text{OH})_2$ , is a hydroxy carbonate obtained by exposing metallic lead to the combined action of carbon dioxide, water vapour, and vapour of acetic acid (Dutch process). It can also be prepared by mixing finely powdered litharge with 1 to 2 per cent. of lead acetate, making into a thin paste with water, and exposing the whole to the action of carbon dioxide until completely decomposed, the resulting carbonate being washed with water (modification of Thénard's process). The product varies to some extent, but its average composition is represented by the formula given.

It occurs as a soft, white, opaque, heavy, non-gritty, amorphous powder, or as a white easily pulverised mass, inodorous, tasteless. Insoluble in water or alcohol, soluble with effervescence in diluted acetic and nitric acids, without leaving any residue (absence of barium, lead, and calcium sulphates). Heated to  $155^\circ$  it loses its water; at  $180^\circ$  it loses carbon dioxide and turns yellow; and on charcoal in the blow-pipe flame it yields globules of metallic lead surrounded by a reddish-yellow incrustation. The nitric acid solution is precipitated by sodium hydroxide, the precipitate being soluble in excess of the alkali; on completely precipitating the alkaline solution with excess of sulphuric acid the filtrate should be colourless, and should not be precipitated or coloured by potassium ferrocyanide (absence of zinc and copper), or by excess of ammonia (absence of aluminium). If 2 grammes of the salt be dissolved in 20 per cent. solution of nitric acid it should not leave more than 2 centigrams of residue (limit of insoluble foreign matter); on completely precipitating the solution with hydrogen sulphide the filtrate should not leave more than a slight residue on evaporation (limit of salts of the alkalies, alkaline earths, or zinc).

If heated to redness it should leave about 85 per cent. of residue. The normal carbonate,  $\text{PbCO}_3$ , is obtained by precipitating a solution of a lead salt with ammonium carbonate.

Lead carbonate is used in medicine as a sedative and astringent application to excoriated surfaces, ulcers, boils, etc. It is commonly employed as Unguentum Plumbi Carbonatis.

NOTES.—Paints containing lead are blackened by exposure to air containing traces of hydrogen sulphide. Exposure to light and pure air, however, bleaches the blackened surface, converting the lead sulphide by oxidation into white sulphate. This reaction does not take place in the dark.

### PLUMBI IODIDUM.

LEAD IODIDE.

$\text{PbI}_2 = 460.84$ .

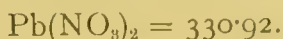
Lead iodide,  $\text{PbI}_2$ , may be prepared by dissolving 8 of potassium iodide in 5 of boiling water, adding a solution of 8 of lead nitrate in 40 of boiling water, allowing the mixture to cool, collecting the precipitate, washing with cold water, and drying between filter-paper in a warm place.

It occurs, if prepared as above, in the form of thin, shining, golden-yellow scales. If precipitated from cold solutions it is a bright lemon-yellow, heavy powder, inodorous, tasteless, or with only a slight metallic taste, permanent in air. Soluble in cold water (about 1 in 2000), in boiling water (about 1 in 200), forming a colourless solution from which on cooling the salt separates in brilliant golden-yellow scales, more readily soluble in solutions of ammonium chloride, potassium iodide, alkaline acetates, sodium thiosulphate, with partial conversion into double iodides; very slightly soluble in alcohol, insoluble in ether and in chloroform. The aqueous solutions are neutral to litmus paper. When heated it becomes red, then black, and if air be excluded fuses and volatilises; in contact with air it melts, giving off iodine and leaving a yellow crystalline mass of basic lead iodide. It is decomposed by light with liberation of iodine, especially in presence of moisture. If 1 gramme be triturated with 2 grammes of ammonium chloride and 2 mls of water a nearly white mixture results. When heated in a test-tube on a water-bath for a few minutes this mixture should form a clear colourless solution (absence of chromate and other insoluble foreign salts); on cooling, a solid mass of nearly colourless fine silky crystals is produced, and on the addition of water and diluted sulphuric acid yellow lead iodide will separate. It should be free from acetates, nitrates and other soluble foreign salts, and should contain not less than 99 per cent. of pure lead iodide.

Lead iodide is used externally in the form of Unguentum Plumbi Iodidi for application to glandular enlargements; for chronic joint enlargement Emplastrum Plumbi Iodidi is used as a mild counter-irritant. It was formerly given internally in doses of 3 to 18 centigrams ( $\frac{1}{2}$  to 3 grains) for chronic glandular swellings, etc.

**PLUMBI NITRAS.**

LEAD NITRATE.



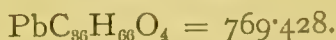
Lead nitrate,  $\text{Pb}(\text{NO}_3)_2$ , may be obtained by dissolving metallic lead or its oxide or carbonate in diluted nitric acid, evaporating the solution, cooling and crystallising.

It occurs in the form of colourless transparent, octahedral crystals, or as white opaque crystals, according to whether it is crystallised from cold or hot solutions. It is odourless, and has a sweetish, astringent, afterwards metallic, taste. Soluble in cold water (about 1 in 2), and in boiling water (1 in 0.75), but almost insoluble in alcohol. On heating it decrepitates vigorously, giving off oxygen and nitrogen peroxide, leaving a residue of litharge. The aqueous solution reacts acid with litmus. The 10 per cent. solution should give a pure white precipitate with solution of potassium ferrocyanide (absence of copper and iron). It should not contain more than traces of salts of magnesium, calcium, zinc, iron, or the alkali metals.

This salt of lead is more irritating than others, owing to its greater solubility, and to the liberation of nitric acid in contact with the proteins of the tissues.

**PLUMBI OLEAS.**

LEAD OLEATE.



Lead oleate,  $\text{Pb}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2$ , may be prepared by warming 100 parts of oleic acid in a porcelain dish to about 60° to 65°, then adding a solution of 16 parts of sodium hydroxide dissolved in a mixture of 30 parts of alcohol and 90 parts of water, until the acid is nearly neutralised, as shown by testing a small portion of the solution with a few drops of solution of phenol-phthalein, when not more than a faint pink colouration should appear. This soap is then dissolved in about 2000 parts of water, and into it is poured with constant stirring a solution of 67 parts of lead acetate in about 800 parts of water. The resulting precipitate should settle rapidly, leaving a clear supernatant liquid. The precipitate is collected, well washed until all traces of the salt formed in the reaction have been removed, and dried by spreading on porous tiles or bibulous paper.

It occurs as an unctuous, granular powder. Soluble in alcohol, ether, turpentine, benzene, and in a mixture of alcohol and ether. It contains 28.9 per cent. of lead oxide.

Lead oleate is a sedative and mild astringent when applied to excoriated surfaces. For this purpose, and for use in eczema, it may be mixed with zinc oleate and reduced to fine powder with starch. More frequently it is applied as Unguentum Diachyli; this ointment is usually prepared from Emplastrum Plumbi, but a similar preparation may be made by melting together equal parts of precipitated lead oleate and olive oil.



**PLUMBI OXIDUM.**

LEAD OXIDE.

 $\text{PbO} = 222.9.$ *Synonyms.*—Massicot ; Litharge ; Lead Monoxide.

Lead oxide,  $\text{PbO}$ , is prepared on the large scale by heating lead in contact with air ; at a moderate heat the oxide is obtained in the form of a yellow powder, in which state it is known commercially as massicot ; at a higher temperature the oxide melts and on cooling forms a scaly mass, which is known as litharge.

It occurs as a heavy, yellowish, reddish-yellow or pale brick-red powder more or less crystalline, or as small scales ; odourless and tasteless. Very slightly soluble in water ; the presence of a small quantity of saline matter in the water lessens the solubility, but the presence of organic matter (especially sugar) increases it ; the slight solubility in water is probably accompanied with formation of lead hydroxide,  $\text{Pb}(\text{OH})_2$ , and the solution is faintly alkaline. Insoluble in alcohol ; soluble in acetic acid and in diluted nitric acid with formation of salts ; soluble in hot solutions of alkaline hydroxides, depositing in pink crystals on cooling ; soluble in glycerin and in saccharine solutions. On exposure to the air it slowly absorbs carbon dioxide and moisture, especially when in the state of fine powder. When heated it becomes reddish-brown in colour, yellow again on cooling ; at a bright red heat it fuses, in which state it readily attacks clay crucibles, forming a fusible silicate of lead ; heated in contact with charcoal it is reduced to the metallic state. It is energetically reduced by calcium carbide at a red heat and in presence of excess of the latter evolves carbon dioxide and forms an alloy of lead and calcium, which is slowly but completely decomposed in contact with steam. It is a powerful base and has a strong tendency to form basic salts. Impurities such as sand, ferric oxide, lime, and nitrates are frequently present in lead oxide, and should be looked for. The oxide should be free from more than traces of carbonates, metallic lead and copper ; and should leave not more than a trifling residue on solution in diluted nitric acid (absence of silicates, barium sulphate, etc.). It should not contain more than 4 per cent. of insoluble matter on dissolving in acetic acid ; and on strongly heating it should not lose more than 4 per cent. of its weight (limit of carbonate and moisture). It should contain at least 96 per cent. of lead oxide.

Lead oxide is used in pharmacy principally in the preparation of *Emplastrum Plumbi*, and of the glycerin and aqueous solutions of subacetate of lead.

**PODOPHYLLI INDICI RESINA.**

INDIAN PODOPHYLLUM RESIN.

Indian podophyllum resin is prepared by exhausting Indian podophyllum rhizome, in No. 40 powder, by percolation with alcohol,

recovering most of the alcohol by distillation and precipitating the resin from the residual liquid by pouring it, with constant stirring, into ten times its volume of distilled water acidulated with one twenty-fourth its bulk of hydrochloric acid. The mixture is allowed to stand for twenty-four hours, after which the resin is collected on a filter, washed with distilled water, and dried at a temperature not exceeding  $37.7^{\circ}$ .

It occurs in a bitter, yellowish or brownish powder, soluble in alcohol and in solution of ammonia, but only partly soluble in ether, and insoluble in water or acids. The powder should not yield more than 1 per cent of ash when incinerated.

Indian podophyllum resin is official in India and the Eastern Colonies, where it is used in place of ordinary podophyllum resin, which it resembles in its properties.

*Dose*.—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

### PODOPHYLLI INDICI RHIZOMA.

#### INDIAN PODOPHYLLUM RHIZOME.

Indian podophyllum rhizome is obtained from *Podophyllum Emodi*, Wallich (N.O. Berberideæ), a plant indigenous to Northern India. The rhizome is collected and dried with the roots attached.

The rhizome occurs in brown, horizontal, more or less contorted pieces, 6 to 8 millimetres or more in thickness. The upper surface bears numerous tuberosities and exhibits circular or oval scars, the lower surface bears numerous stout cylindrical roots. The fracture is white, short, and starchy, or yellow and horny, the fractured surface exhibiting a thin, brown, cortical layer and a circle of fibrovascular bundles. The odour is faint, the taste bitter and acrid.

The chief constituents of Indian podophyllum are podophyllotoxin (2 to 5 per cent.) and podophylloresin (compare *Podophylli Rhizoma*). The drug yields from 6 to 12 per cent. of podophyllin when treated in the same way as the American rhizome, but the podophyllin so obtained is not identical with, nor should it be substituted for, that from the American drug, since it contains approximately twice as much podophyllotoxin, and in other respects exhibits differences (compare *Podophylli Rhizoma*).

Indian podophyllum rhizome is official in India and the Eastern Colonies, where it is used in place of ordinary podophyllum; it is stated to be twice as active as the latter.

*Dose*.—2 to 6 decigrams (3 to 10 grains).

### PODOPHYLLI RESINA.

#### PODOPHYLLUM RESIN.

*Synonym*.—Podophyllin.

Podophyllum resin is prepared by exhausting podophyllum rhizome, in No. 40 powder, by percolation with alcohol, recovering most of the alcohol by distillation, and precipitating the resin from

the residual liquid by pouring it, with constant stirring, into ten times its volume of distilled water previously acidulated with one twenty-fourth its bulk of hydrochloric acid. The mixture is allowed to stand for twenty-four hours, after which the resin is collected on a filter, washed with distilled water, and dried at a temperature not exceeding 37.7°.

It occurs in a bitter, yellowish or brownish powder. Soluble in alcohol and in solution of ammonia, but insoluble in water or acids. The powder should not yield more than 1 per cent. of ash when incinerated.

The resin of *Podophyllum peltatum* can be distinguished from that of *P. Emodi*, which may sometimes be supplied for it, by the following test:—To 4 decigrams of the resin in a test-tube add 3 mls of alcohol (60 per cent.) and 5 decimils of solution of potassium hydroxide, and shake gently. In the case of the Indian resin (*P. Emodi*) the mixture becomes a semi-solid gelatinous mass in a few seconds. If necessary the mixture may be brought to the boiling-point, when, on cooling, it will be found to have gelatinised. The official resin under this treatment gives a dark fluid showing no signs of gelatinisation even after some days.

Podophyllum resin is a drastic purgative, in large doses causing acute inflammation of the stomach and intestines with violent peristaltic contractions. It contains the active principles of podophyllum with some inert material. It has some cholagogue action and is employed in some severe cases of habitual constipation. It is usually given in pills with extract of henbane or belladonna to prevent griping, often in combination with aloes, colocynth, or rhubarb. A tincture of podophyllum resin is prepared under the name Tinctura Podophylli; it may be given in mixture form with the tinctures of nux vomica and euonymin, the resin being suspended with a little mucilage of acacia, or it may be prescribed with aromatic spirit of ammonia, when the resin is held in solution. Tinctura Podophylli Ammoniata also has the advantage of miscibility with water without precipitation. Liquid preparations of podophyllum are, however, acrid and disagreeable.

*Dose*.—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

## PODOPHYLLI RHIZOMA.

### PODOPHYLLUM RHIZOME.

*Synonyms*.—Podophyllum; May Apple; Mandrake.

Podophyllum rhizome is obtained from *Podophyllum peltatum*, Linn. (N.O. ~~Ranunculaceae~~), a herb indigenous to the Eastern United *Berberid* States and Canada. The rhizome is collected late in the summer and dried with the roots attached. It is usually cut into pieces a few inches in length.

The rhizome occurs in nearly cylindrical pieces, from 6 to 18 centimetres long, and 5 to 8 millimetres thick. Its surface is



smooth, or slightly wrinkled longitudinally, and of a dark reddish-brown colour. The rhizome is enlarged at intervals of about 5 centimetres, and bears on the upper surface a concave scar, surrounded by circular leaf scars; at the same part, but on the under surface of the rhizome, are the lighter scars of the roots. Pieces of the rhizome break with a short fracture, the interior being white and starchy or yellowish and horny. The odour of the drug is characteristic, and its taste is bitter and acrid.

The chief constituents of podophyllum rhizome are a neutral crystalline substance named podophyllotoxin (0.2 to 1 per cent.) and an amorphous resin, podophylloresin, both of which are purgative. The drug also contains fatty matter and quercetin. Podophyllotoxin,  $C_{15}H_{14}O_6$ , melts at  $117^{\circ}$ ; alkalies convert it into the salt of an unstable, gelatinous acid, podophyllic acid; this readily loses water and furnishes crystalline picropodophyllin (melting-point,  $227^{\circ}$ ), which is isomeric with podophyllotoxin, and probably the lactone of podophyllic acid. A concentrated alcoholic tincture poured into acidulated water deposits the resinous mixture known as "podophyllin." Of this the drug yields from 2 to 6 per cent. It yields about 3 per cent. of ash on incineration.

Podophyllum rhizome is used almost entirely in the form of podophyllum resin (see Podophylli Resina).

*Dose.*—2 to 6 decigrams (3 to 10 grains).

## POTASSA SULPHURATA.

SULPHURATED POTASH.

*Synonym.*—Liver of Sulphur.

Sulphurated potash is a mixture of potassium sulphides and other potassium compounds, prepared by heating dried potassium carbonate and sulphur in a crucible until effervescence has ceased and the whole is in a state of perfect fusion. The liquid is then poured out on to a clean flagstone, and covered with an inverted porcelain basin to prevent free access of air. When cool the solidified mass is broken into fragments.

It occurs in solid, greenish fragments, which are liver-brown when recently broken, and have an acrid alkaline taste. About 50 per cent. should be soluble in alcohol. Its aqueous solution has the odour of hydrogen sulphide, and evolves it freely when excess of hydrochloric acid is added, sulphur being deposited.

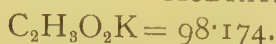
Sulphurated potash is employed as a parasiticide, for "sulphur baths," in rheumatism, and as a stimulant to the skin in chronic cutaneous diseases. An ointment is prepared (1 in 16 of benzoated lard) for use in place of sulphur ointment in acne, eczema, etc. Weak baths are employed in chronic rheumatic arthritis and in chronic eczema and psoriasis; stronger baths are used in scabies (see Balneum Sulphuratum). It has been employed internally in doses of 12 to 60 centigrams (2 to 10 grains), but sulphurated lime is now usually preferred; the potash compound may cause serious

poisoning, owing to the evolution of sulphuretted hydrogen in the gut, with accompanying local and constitutional symptoms.

NOTES.—Sulphurated potash should be kept in well-stoppered, glass bottles. There is a great want of uniformity both in the physical characters and composition of ordinary commercial samples. The colour may vary from a dull yellow to dark green, and the flame test from a pronounced potassium flame to an overpowering sodium flame. Also the solution in water may be a light liquid, or very darkly coloured. If of good quality it should completely disintegrate in water, forming an opalescent solution.

## POTASSII ACETAS.

POTASSIUM ACETATE.



Potassium acetate,  $\text{CH}_3\text{COOK}$ , may be prepared by fusing the product of the interaction of acetic acid and potassium carbonate.

It occurs in white, foliaceous, crystalline masses of a satin-like lustre, or in granular particles. The salt has a warming, saline taste, is very deliquescent, and alkaline to litmus. Soluble in water (2 in 1), and in alcohol (1 in 2). Heated to  $292^\circ$  it fuses, and at a higher temperature decomposes, blackens, and evolves vapours having an empyreumatic odour. Ignited on platinum it leaves a white residue completely soluble in water. On ignition of the freshly dried salt, and subsequent volumetric determination of the carbonate, not less than 98 per cent. of potassium acetate should be indicated. It should be free from lead, copper, arsenium, iron, aluminium, calcium, magnesium, carbonates, and sulphides, and should not contain more than traces of chlorides or sulphates.

Potassium acetate has the general properties of the organic salts of potassium (see Potassii Citras). It is employed as a diuretic in dropsical conditions, especially of renal origin, and in febrile diseases. It decreases the acidity of the urine, being excreted as carbonate, and is thus of service as an anti-lithic in gouty disorders. It is best administered in dilute aqueous solution in mixture form; its saline taste may be disguised with syrup of orange. It is often given with infusion of buchu or decoction of broom as vehicle, or it may be combined with Tinctura Ferri Acetatis.

*Dose.*— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

NOTES.—Good commercial specimens of potassium acetate may yield nearly 10 per cent. of moisture when dried at  $110^\circ$ . Solution of potassium acetate is prepared by dissolving 10 of the salt in sufficient distilled water to produce 100 by volume, and filtering.

## POTASSII BENZOAS.

POTASSIUM BENZOATE.



Potassium benzoate,  $\text{KC}_7\text{H}_5\text{O}_2, 3\text{H}_2\text{O}$ , may be prepared by adding 82 of potassium hydrogen carbonate to 100 of benzoic acid suspended in 200 of hot water. After evolution of carbon dioxide has ceased, the liquid is neutralised exactly by the addition of either benzoic

acid or potassium hydrogen carbonate, filtering the solution, and evaporating with frequent stirring.

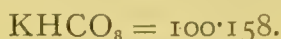
It occurs in the form of small, efflorescent laminæ or as a white crystalline powder. Soluble in water (1 in  $1\frac{1}{2}$ ), and in alcohol (1 in 18). The alcoholic solution is decomposed by carbon dioxide. On distillation potassium benzoate yields terephthalic and isophthalic acids.

Potassium benzoate has the properties of benzoic acid, and is employed principally in cystitis, gout, and rheumatism. It is given in solution in mixture form, or it may be dispensed in cachets. It is incompatible with ferric salts.

*Dose.*—10 to 12 decigrams (15 to 20 grains).

### POTASSII BICARBONAS.

POTASSIUM BICARBONATE.



*Synonym.*—Potassium Hydrogen Carbonate.

Potassium bicarbonate,  $\text{KHCO}_3$ , may be prepared by saturating a strong aqueous solution of potassium carbonate with carbonic anhydride.

It occurs in colourless monoclinic prisms, or as a granular, odourless, non-deliquescent powder, with a saline, feebly alkaline taste. Soluble in water (1 in 3.2), but insoluble in alcohol. At high temperatures the solution rapidly loses carbon dioxide, and after being boiled contains only potassium carbonate. When exposed to a low red heat it should leave a white residue of carbonate, which, when determined volumetrically, should indicate not less than 99 per cent. of potassium bicarbonate. It should be free from lead, copper, arsenium, aluminium, calcium, magnesium, sodium, nitrates, sulphates, or sulphides, and should not show more than slight traces of iron or chlorides.

Potassium salts taken by the mouth have very little action attributable to the K ion, since the latter is excreted more quickly than it is absorbed. They are consumed often in large quantities with food, and are rapidly excreted by the kidneys. Injected subcutaneously or intravenously, potassium salts act as a powerful poison to the heart and nervous system, and they may generally be regarded as mild protoplasmic poisons. They are usually more irritant to the stomach than sodium salts, and exert more marked diuretic action. Potassium bicarbonate is important chiefly because of the  $\text{CO}_3$  ion; it is given internally for its effects on the stomach and for its action after absorption. It neutralises gastric hyperacidity, relieving pain, discomfort and distention; for this purpose it is taken twenty to thirty minutes after a meal. Taken thirty minutes before a meal, on an empty stomach, it inhibits gastric secretion (see under Sodii Carbonas). For its action after absorption, potassium bicarbonate is used to reduce acidity of the urine in gravel, gout, and rheumatism, and to neutralise the acids

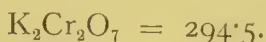


formed in the tissues in the later stages of diabetes. It is used with expectorants in the treatment of bronchial catarrh and bronchitis, to render the mucous secretion more fluid and more easily expectorated. It is also valuable in acute catarrhal conditions of the bladder and urethra, and inhibits the formation of crystalline sodium biurate in the tissues. Potassium bicarbonate is administered in dilute aqueous solution in mixture form. For neutralisation, 20 parts by weight of potassium bicarbonate require 14 of citric acid, or 15 of tartaric acid.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

### POTASSII BICHROMAS.

POTASSIUM BICHROMATE.



*Synonyms.*—Potassii Dichromas; Potassium Dichromate;  
Red Chromate of Potassium.

Potassium bichromate,  $\text{K}_2\text{Cr}_2\text{O}_7$ ,  $\text{CrO}_3$ , may be obtained by roasting chrome iron stone with lime in the presence of air, treating the resulting chromate with a potassium salt, and subsequently with an acid.

It occurs in large, orange-red, transparent, triclinic prisms, odourless, and having an acid metallic taste. Soluble in cold water (1 in 10), and in boiling water (1 in 1.2), but insoluble in alcohol. It fuses below redness, without loss of weight, forming a dark brown liquid, but at a higher temperature it is decomposed and leaves a residue of neutral potassium chromate and green chromic oxide. The aqueous solution is acid to litmus, and when treated with sulphuric acid and alcohol assumes an emerald-green colour and gives off the odour of aldehyde. Determined volumetrically, at least 99 per cent. of potassium bichromate should be indicated.

Potassium bichromate is rarely employed internally, but has recently been recommended for use in gastric ulcer and some forms of dyspepsia. It is administered in the form of pill, prepared by triturating the salt with kaolin and massing with kaolin mass or wool fat.

*Dose.*—6 to 12 milligrams ( $\frac{1}{10}$  to  $\frac{1}{5}$  of a grain).

*NOTES.*—Potassium chromate,  $\text{K}_2\text{CrO}_4$  (=194.4), occurs in yellow crystals, and is used as a reagent. Solution of potassium chromate is prepared by dissolving 10 of the salt in sufficient distilled water to produce 100, and filtering.

### POTASSII BROMIDUM.

POTASSIUM BROMIDE.



Potassium bromide, KBr, may be prepared by adding a slight excess of bromine to a strong solution of potassium hydroxide, evaporating the solution of potassium bromide and bromate to

dryness, decomposing the bromate by fusing the mixture with charcoal, and purifying by crystallisation; or it may be prepared by the action of potassium carbonate on ferrous bromide.

It occurs in colourless or white, odourless, cubical crystals, with a strongly saline taste. Soluble in cold water (1 in 1.7), in boiling water (1 in 1), in cold alcohol (1 in 180), and in boiling alcohol (1 in 17), also soluble in glycerin. If 5 decigrams of the salt be dissolved in 10 mils of water, the solution should be coloured yellow and not red or reddish-brown on the addition of 2 drops of test solution of ferric chloride, indicating the absence of more than 0.01 per cent. of ammonium thiocyanate. One gramme of potassium bromide dissolved in water should require for complete precipitation not less than 83.7 nor more than 85.4 mils of decinormal silver nitrate solution. Potassium bromide should be free from lead, copper, arsenium, iron, aluminium, zinc, calcium, magnesium, sodium, ammonium, bromates, iodates, or cyanides, and should not show more than the slightest reactions for chlorides, iodides, or sulphates.

Potassium bromide is used for its action on the central nervous system. It depresses the psychical functions, the motor area, the medulla and cord, all the cells being affected at the same time. This effect is produced by a direct action of the drug on the nerve cells; by lowering the activity of both motor and sensory cells, the bromides are of great service in controlling epilepsy, and in the treatment of cerebral excitement. Through their influence on the medulla and cord they produce a general diminution of all the reflexes and promote sleep by rendering the brain less sensitive to disturbing influences. They are powerful sexual sedatives and anaphrodisiacs. By the continued use of large doses, symptoms of "bromism" may arise; these consist of nausea and vomiting, mental dulness and lapse of memory, general muscular weakness and reduction of sensibility throughout the body. Various forms of skin eruption may follow the use of the bromides; acne of the head and shoulders is the commonest form, but abscesses and erythematous rashes are sometimes seen. Bromide eruptions are said to be due to a lowered resistance to staphylococcic infection, but they are more likely to be caused by the irritant action of free bromine liberated during excretion from the cutaneous glands. The bromides are largely used in the treatment of epilepsy, the potassium salt is generally preferred, but the other alkali bromides are similarly employed. They are also employed in other affections of the central nervous system, as in chorea, the convulsions of children, and in some forms of hysteria. Potassium bromide is employed to induce sleep, when sleeplessness is caused by anxiety or overwork; it is useless in sleeplessness from pain. It is used with success in sea-sickness, often in combination with chloramide, and also in the sickness of pregnancy. It is a useful sedative in whooping-cough, spasmodic asthma, and nervous headache. Potassium bromide is given in solution in mixture form, or as Potassii Bromidum Effervescens. It is not suitable for administration in tablets, which frequently

cause pain in the stomach during solution. It is incompatible with oxidising substances and with Spiritus Ætheris Nitrosi.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

NOTE.—Some English samples of potassium bromide contain less than  $\frac{1}{4}$  per cent. of chloride, while American samples may contain as much as 6 per cent.

## POTASSII BROMIDUM EFFERVESCENS.

EFFERVESCENT POTASSIUM BROMIDE.

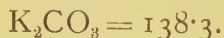
Potassium Bromide	...	...	...	8.00
Sodium Bicarbonate, in powder	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	24.00
Citric Acid, in powder	...	...	...	16.00
Refined Sugar, in powder	...	...	...	16.00

Mix and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—4 to 12 grammes (60 to 180 grains).

## POTASSII CARBONAS.

POTASSIUM CARBONATE.



*Synonym.*—Salt of Tartar.

Potassium carbonate,  $\text{K}_2\text{CO}_3$ , may be prepared from wood ashes or by the interaction of potassium sulphate, calcium carbonate, and carbon. The resulting potassium carbonate will contain one or two molecules of water of crystallisation.

It occurs as white, odourless, crystalline or granular powder, having a strong alkaline taste, and very deliquescent. Soluble in water (4 in 3), but insoluble in alcohol. When heated to  $130^\circ$  the salt loses all the water it may have retained or absorbed; at a bright red heat it fuses, and at a white heat it volatilises. Exposure to a low red heat should leave a residue corresponding to 83 to 85 per cent. of anhydrous potassium carbonate. Determined volumetrically 84 per cent. of potassium carbonate should be indicated. It should be free from lead, copper, aluminium, calcium, magnesium, sodium, cyanides, nitrates, sulphates, sulphides, or thio-sulphates, and should give only the slightest reactions with the tests for iron, and no strongly marked reactions with tests for chlorides.

The properties of potassium carbonate resemble those of potassium bicarbonate. It is more caustic and irritating, and is rarely given internally. It is sometimes applied externally as a lotion in eczema and urticaria (30 grains to 1 pint).

*Dose.*—3 to 12 decigrams (5 to 20 grains).

NOTES.—For analytical purposes pure anhydrous potassium carbonate may be obtained by heating the pure bicarbonate to a low red heat until it ceases to lose weight. Solution of potassium carbonate is prepared by dissolving 10 of the salt in sufficient distilled water to produce 100 by volume, and filtering.



**POTASSII CHLORAS.**

POTASSIUM CHLORATE.



Potassium chlorate,  $\text{KClO}_3$ , may be prepared by adding potassium chloride to a liquid obtained by passing chlorine into water in which lime or magnesia has been suspended, and subsequently crystallising; it is also obtained by electrolysis of potassium chloride solutions.

It occurs in colourless, monoclinic prisms, or as a white crystalline powder, without odour, and with a cool saline taste. Soluble in cold water (1 in 16), in boiling water (1 in 2), in alcohol (1 in 1700), in 60 per cent. alcohol (1 in 152). Soluble in glycerin (1 in 1429). On strongly heating it fuses and decomposes with evolution of oxygen, leaving a white residue of potassium chloride. Moistened with hydrochloric acid a yellow gas consisting of chlorine and chloric oxide is evolved. A concentrated aqueous solution is neutral to litmus, and when warmed with hydrochloric acid becomes greenish-yellow, and evolves chlorine. Potassium chlorate is permanent in air, but dangerous when carelessly handled, especially in contact with organic or easily oxidisable substances. It should be free from lead, iron, aluminium, calcium, magnesium, sodium, and nitrates, and almost free from chlorides and sulphates.

It has been stated that the chlorates give up oxygen to the tissues, and it is largely on this account that they have received wide employment in foul conditions of the mouth and pharynx. It is, however, probable that reduction takes place only in contact with putrefying organic matter, nascent oxygen being liberated under such conditions, but not under normal conditions. The chlorates are rapidly absorbed, and are continuously eliminated by the salivary glands, mucous membranes, and kidneys. Large doses of potassium chlorate are actively poisonous. Met-hæmoglobin is set free in the blood serum, the red corpuscles are disintegrated, and cyanosis results from deficient oxygenation of the blood, death occurring from respiratory failure; there may, however, be complete recovery from the acute symptoms, death occurring five or six weeks later from nephritis caused by blocking of the fine renal tubules with the disintegrated blood debris. Potassium chlorate is used as a wash for the mouth (1 in 40) when the gums are inflamed or spongy, for aphthous conditions, in tonsillitis, and in the stomatitis following the prolonged use of mercury. It has been employed (1 in 60) as an injection into the bladder in vesical catarrh, and as a lotion to foul ulcers. The salt is not much used internally, and should never be given to young children. It is often prescribed in gargles with borax, potassium nitrate, or iron perchloride, and is much used in the form of lozenge, pastille, and compressed tablet. It is incompatible with sulphur, charcoal, ferrous salts, tannin, and other readily oxidisable substances; triturated with these or with sugar, antimony sulphide, etc., it forms violently explosive mixtures. Potassium chlorate should always be handled with caution and, in mixing it with any dry substance, friction and percussion should be avoided. In cases

of poisoning by potassium chlorate, the stomach should be evacuated, and alkali bicarbonates administered.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

## POTASSII CHLORIDUM.

POTASSIUM CHLORIDE.

$\text{KCl} = 74.6.$

*Synonym.*—Sal Digestivum Sylvii.

Potassium chloride,  $\text{KCl}$ , is obtained commercially from natural deposits, chiefly from carnallite, a double chloride of potassium and magnesium, occurring in Germany. The mineral resembles rock-salt in appearance, but is very deliquescent, and yields a magma of potassium chloride crystals when treated with water. The salt is recrystallised from water. Pure potassium chloride may be prepared by neutralising a solution of 10 of pure potassium carbonate with 22 of 25 per cent. hydrochloric acid, maintaining a slight acidity, filtering, evaporating, and drying the salt at  $105^{\circ}$ .

It occurs in the form of colourless, cubical crystals or quadrangular prisms, or as a crystalline powder, inodorous, having a saline and slightly bitter taste, resembling that of table salt; anhydrous, permanent in the air. Soluble in cold water (1 in 3), more freely in boiling water; soluble in diluted alcohol, insoluble in absolute alcohol, ether, or concentrated hydrochloric acid. Its aqueous solution is neutral. It decrepitates when heated, melts at  $734^{\circ}$ , without decomposition, and volatilises at a higher temperature. In contact with a non-luminous flame it should produce a violet-coloured flame without any tinge of yellow; it should be free from lead, copper, calcium, iron, magnesium, and sulphates.

Potassium chloride has been recommended for use as a table salt in place of sodium chloride. In the case of gouty and "rheumatic" patients, the substitution of potassium for sodium salts in the food is recommended as a means of retarding the formation of biurates in the tissues. Potassium chloride does not exhibit the depressant action of the  $\text{K}$  ion on the tissues, because it is excreted with such extreme rapidity that the blood never contains it in a sufficient state of concentration to produce the specific effect.

*Dose.*—1 to 4 grammes (15 to 60 grains).

## POTASSII CITRAS.

POTASSIUM CITRATE.

$\text{K}_3\text{C}_6\text{H}_5\text{O}_7, \text{H}_2\text{O} = 324.506.$

Potassium citrate,  $\text{C}_3\text{H}_4\text{OH}(\text{COOK})_3, \text{H}_2\text{O}$ , may be prepared by neutralising citric acid with potassium carbonate.

It occurs as a white, granular, odourless, deliquescent powder, having a cooling saline taste. Soluble in cold water (1 in 0.6), glycerin (1 in 2), and 60 per cent. alcohol (1 in 9). The aqueous solution is alkaline to litmus, but not to phenol-phthalein. On

incineration and subsequent determination of the carbonate not less than 98 per cent. of hydrated potassium citrate should be indicated. It should be free from lead, iron, calcium, magnesium, sodium, carbonates, and tartrates, and almost free from chlorides and sulphates.

Potassium citrate, when taken internally, is partly absorbed and oxidised in the tissues to alkali carbonate, in which form it is excreted. It therefore renders the blood and urine more alkaline, having the remote effect of the bicarbonates without their neutralising action upon gastric secretion. As the alkali citrates are absorbed more readily than the tartrates, their laxative action is less marked. The alkali citrates lower the rate of coagulation of the blood, owing to their action in removing free Ca ions; they are therefore contraindicated in those conditions in which the coagulability of the blood is already low, as in hæmophilia. Potassium citrate is employed principally to increase the quantity of urine and render it alkaline in gout and rheumatism, in catarrhal conditions of the bladder and urethra, and as a mild diaphoretic and febrifuge in feverish conditions. It is given in mixtures, and Potassii Citras Effervescens is a convenient antacid for daily use by gouty and rheumatic subjects.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  grammes (10 to 40 grains).

NOTE.—This salt is officially represented as anhydrous, but the anhydrous salt cannot be obtained by drying at a temperature below  $200^{\circ}$ , and the salt chars at temperatures slightly above that point.

## POTASSII CITRAS EFFERVESCENS.

### EFFERVESCENT POTASSIUM CITRATE.

Potassium Citrate	...	...	...	...	16.00
Sodium Bicarbonate, in powder	...	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	...	24.00
Citric Acid, in powder	...	...	...	...	14.00
Refined Sugar, in powder	...	...	...	...	14.00

Mix and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—4 to 8 grammes (60 to 120 grains).

NOTE.—Potassii Citras Effervescens, U.S.P., is prepared by drying 20 of potassium citrate on a water-bath until it ceases to lose weight, then powdering the dried salt, mixing it intimately with 16.2 of citric acid and 25.2 of tartaric acid, and thoroughly incorporating 47.7 of dried sodium bicarbonate.

## POTASSII CYANIDUM.

### POTASSIUM CYANIDE.

KCN = 65.16.

Potassium cyanide, KCN, may be prepared by heating dry potassium ferrocyanide to low redness, excluding air until the residue has cooled; nitrogen escapes and the potassium cyanide remains mixed with carbide of iron. Or it may be prepared by passing hydrocyanic acid gas, generated from potassium ferrocyanide by sulphuric acid, into a solution of potassium hydroxide in five or six times its volume of strong alcohol. The bulky crystalline



precipitate is drained, washed with strong alcohol, and dried between bibulous paper at a moderate heat.

It occurs in the form of white, cubical crystals, or in white, opaque, fused masses, and it is sometimes fused into sticks. Deliquescent and having the odour of hydrocyanic acid. When absolutely dry, however, it is odourless. It is intensely poisonous, and great caution should be observed in handling it. Soluble in water (1 in  $2\frac{1}{4}$ ), in alcohol (almost entirely, 1 in 100), in boiling alcohol (1 in 80), in weaker alcohol in larger proportion. The aqueous solution is strongly alkaline to litmus paper, dissolves iron, zinc, copper, and nickel with evolution of hydrogen; in presence of oxygen it dissolves silver and gold. It removes the stain of silver nitrate from the skin. The aqueous solution is decomposed on exposure to air, absorbing carbon dioxide; on boiling it is partly decomposed, yielding ammonia and potassium formate. The cyanide fuses at a low red heat, and volatilises unchanged (in absence of moisture) at full red heat. Heated with metallic oxides it gives potassium cyanate and metal, thus acting as an energetic reducer. Fused with sulphur it yields potassium sulphocyanide. Heated with potassium chlorate or nitrate it detonates violently. The addition of diluted hydrochloric acid should not produce more than a slight effervescence (limit of carbonate). Diluted hydrochloric acid in slight excess with a drop of ferric chloride solution should not produce a blue colour (absence of ferrocyanide) nor a red colour (absence of sulphocyanide). It should be free from sulphates and almost free from chlorides.

Potassium cyanide is rarely given internally, but its use in solution has been suggested as a substitute for diluted hydrocyanic acid.

*Dose.*—4 to 16 milligrams ( $\frac{1}{16}$  to  $\frac{1}{4}$  grain).

*NOTES.*—Commercial fused potassium cyanide occurs in various strengths (40 per cent. real KCN, and less), but it is easily obtained of 96 per cent.; it is officially stated that it should contain at least 90 per cent. of potassium cyanide (U.S.P., 95 per cent.). A double cyanide of sodium and potassium, which contains the cyanide equivalent of 98 to 100 per cent. KCN, is obtainable, as well as a sodium cyanide which contains cyanogen equivalent to 138 per cent. of KCN. Potassium cyanide is much employed by entomologists for killing insects without injury. For this purpose the salt is usually broken into small pieces, and a layer three-quarters to one inch deep placed at the bottom of a wide-mouthed bottle with a well-fitting cork. Thin plaster-of-paris cream is poured over the cyanide to form a level floor, and allowed to set. The bottle is constantly filled with an actively poisonous vapour. Solution of potassium cyanide is a 10 per cent. w/v aqueous solution of the salt.

## POTASSII DIPHOSPHAS.

POTASSIUM DIPHOSPHATE.



*Synonyms.*—Potassium Dihydrogen Phosphate; Potassium Acid Phosphate; Monopotassium Orthophosphate; Potassium Biphosphate.

Potassium diphosphate,  $\text{KH}_2\text{PO}_4$ , may be prepared by dissolving potassium carbonate in phosphoric acid, or by adding phosphoric acid to tripotassium phosphate; another method is to neutralise

100 of phosphoric acid (25 per cent.) with 35 of dried potassium carbonate, and add to the solution 100 of the acid.

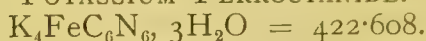
The salt occurs in the form of large, colourless, quadratic crystals. Very soluble in water, the solution having an acid reaction. Melting-point,  $96^{\circ}$ . It is not decomposed at a temperature of  $200^{\circ}$ , but at a red heat it loses one molecule of water and yields potassium metaphosphate,  $KPO_3$ , which has an acid reaction, is very soluble in water, and insoluble in alcohol.

Potassium diphosphate has properties resembling those of sodium diphosphate, and is used to render the urine acid in cystitis and after operations on the bladder. It is a somewhat better diuretic than the sodium salt and is best given in dilute aqueous solution, in small doses frequently repeated.

*Dose.*—1 to 4 grammes (15 to 60 grains).

### POTASSII FERROCYANIDUM.

POTASSIUM FERROCYANIDE.



*Synonym.*—Yellow Prussiate of Potash.

Potassium ferrocyanide,  $K_4Fe(CN)_6, 3H_2O$ , is prepared by heating potassium carbonate in an iron vessel with refuse animal substances such as horns, hoofs, leather, skins, etc., and iron filings, lixiviating with hot water, treating with freshly precipitated iron carbonate, filtering the solution, concentrating, and crystallising.

It occurs in the form of large, translucent, soft, lemon-yellow crystals, tables or prisms, odourless, and having a mild saline taste; slightly efflorescent in dry air. Soluble in cold water (1 in 4); in boiling water (1 in 2); insoluble in alcohol. On heating to  $100^{\circ}$  it becomes anhydrous and white. The aqueous solution is neutral to litmus paper. Diluted sulphuric acid added to the concentrated solution should not cause effervescence (absence of carbonate); the same acid solution when heated evolves hydrocyanic acid. Solution of silver nitrate should produce in the aqueous solution, acidified by nitric acid, a white precipitate free from any tinge of red (absence of ferricyanide). Alkalies fail to precipitate iron from its solution, but on fusing with potassium carbonate, potassium cyanide is formed and metallic iron separates.

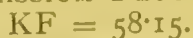
Potassium ferrocyanide is rarely used in medicine, but a 5 per cent. w/v aqueous solution is used as a reagent.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

NOTES.—Potassium ferricyanide, or red prussiate of potash,  $K_3FeC_6N_6$  (= 609.92), occurs in red crystals, and is used as a reagent. Solution of potassium ferricyanide is a freshly prepared 5 per cent. w/v aqueous solution.

### POTASSII FLUORIDUM.

POTASSIUM FLUORIDE.



Potassium fluoride, KF, may be prepared by neutralising a solution of hydrofluoric acid with potassium hydroxide or potassium carbonate

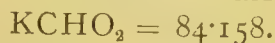
in a silver or platinum dish. If the acid contains a little hydrofluosilicic acid, as the commercial article frequently does, it will form potassium fluosilicate, which may be separated by filtration or decantation. The clear solution is then evaporated to dryness and calcined to drive off any free hydrofluoric acid. The mass is dissolved in warm water, and on evaporating the solution at  $35^{\circ}$  to  $40^{\circ}$  it yields crystals of anhydrous potassium fluoride; at a lower temperature the salt crystallises with two molecules of water ( $\text{KF} + 2\text{H}_2\text{O} = 94.182$ ).

It occurs in colourless, cubical, or prismatic crystals, or as a crystalline powder, having a sharp, saline taste; deliquescent. Very soluble in water, the solution having an alkaline reaction; it attacks glass and porcelain, from which it dissolves the silica. Alcohol precipitates the salt from the concentrated aqueous solution in the form of long, thread-like, radiating crystals, having the composition  $\text{KF} + 2\text{H}_2\text{O}$ . Sulphuric acid decomposes it with liberation of hydrofluoric acid. On heating, it melts below redness without decomposition. With hydrofluoric acid it combines to form an acid fluoride ( $\text{KFHF}$ ), crystallising in quadratic tables. These melt when heated, and at a dull red heat decompose into potassium fluoride and hydrofluoric acid.

Potassium fluoride is not employed in medicine, but is used for technical purposes.

## POTASSII FORMAS.

### POTASSIUM FORMATE.



Potassium formate,  $\text{KCOOH}$ , may be prepared by saturating an aqueous solution of formic acid by potassium carbonate or hydroxide, and evaporating. The solution crystallises with difficulty.

It occurs in the form of anhydrous, transparent, cubical crystals, or as a crystalline powder, deliquescent, and having a bitter, saline taste. Soluble in water, less soluble in alcohol; insoluble in ether. It decrepitates on heating, and melts at  $150^{\circ}$ , to a liquid which solidifies on cooling. The aqueous solution is coloured dark red by ferric salts. Strong sulphuric acid decomposes it with evolution of carbon monoxide. Platinum black moistened with a solution of the salt converts it into potassium carbonate. It reduces salts of silver and mercury on boiling in aqueous solution. It reduces mercuric chloride in the cold to calomel, more rapidly on heating; by prolonged boiling the mercury salt is reduced to the metallic state.

Potassium formate resembles in its action the formates of sodium and calcium (see Sodii Formas). It is given in solution in mixture form; Elixir Formatis Compositum is a palatable preparation of the formates.

*Dose.*—3 to 20 decigrams (5 to 30 grains).

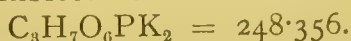
*Notes.*—The acid salt, potassium acid formate,  $\text{CH}_2\text{O}_2\text{CHO}_2\text{K}$  ( $= 130.174$ ), may be obtained by dissolving the neutral salt in formic acid and heating. From the



solution it crystallises on cooling. It occurs in the form of odourless and very deliquescent crystals. Very soluble in water, alcohol, and formic acid, the solutions having a strong acid taste. The aqueous solution loses part of its acid by evaporation on the water-bath.

### POTASSII GLYCEROPHOSPHAS.

POTASSIUM GLYCEROPHOSPHATE.



Potassium glycerophosphate,  $\text{C}_3\text{H}_7\text{O}_6\text{PO}(\text{OK})_2$ , may be prepared by the double decomposition of calcium glycerophosphate and potassium carbonate.

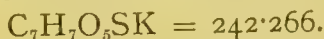
It occurs as a yellowish or brownish amorphous mass (100 per cent.), or as a colourless or yellowish, syrupy liquid of 50 per cent. or 75 per cent., solutions of various strengths being found in commerce. The salt is very hygroscopic, becoming dry only after long heating to  $140^\circ$  to  $150^\circ$ . Soluble in all proportions of water, alkaline in reaction.

Potassium glycerophosphate resembles in its action sodium and calcium glycerophosphates (see Acidum Glycerophosphoricum). It is given with other glycerophosphates, in the form of Glycerinum Glycerophosphatum Compositum, or as the compound syrup.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

### POTASSII GUAIACOLSULPHONAS.

POTASSIUM GUAIACOL-SULPHONATE.



Potassium guaiacol-sulphonate,  $\text{C}_6\text{H}_5\text{OCH}_3\text{OHSO}_3\text{K}$ , is the potassium salt of guaiacol-sulphonic acid.

It occurs as a white powder, odourless, and having a taste at first bitter and afterwards sweet. Readily soluble in water, almost insoluble in alcohol.

Potassium guaiacol-sulphonate contains about 60 per cent. of guaiacol, and is claimed to be one of the best forms for administering this remedy in phthisis and intestinal catarrh; it passes through the system unchanged. It may be given in cachets or in mixtures flavoured with syrup of orange.

*Dose.*—5 to 10 decigrams ( $7\frac{1}{2}$  to 15 grains).

NOTE.—This compound is also known under the trade-name Thiocol.

### POTASSII HIPPURAS.

POTASSIUM HIPPURATE.



Potassium hippurate,  $\text{KC}_9\text{H}_8\text{NO}_8, \text{H}_2\text{O}$ , may be prepared by neutralising solution of potassium carbonate with solution of hippuric acid, filtering and evaporating. The salt is purified by several

recrystallisations from alcohol, and washing with ether. It is difficult to crystallise.

It occurs in the form of pointed rhombic prisms, or as a white crystalline powder. Soluble in alcohol and in boiling water. By desiccation at  $100^{\circ}$  it becomes anhydrous. On heating it gives off vapour with an unpleasant odour. Heated with excess of potassium hydroxide or lime it gives off benzene and ammonia. This is a characteristic reaction. The concentrated aqueous solution, treated with excess of hydrochloric acid, gives a precipitate of hippuric acid in long needles, very slightly soluble in ether. The aqueous solution with solution of ferric chloride yields a cream-coloured precipitate, which is almost insoluble in water, but dissolves in presence of free hippuric acid or excess of ferric chloride, and in alcohol. The aqueous solution yields white curdy precipitates with solutions of silver and mercurous nitrates. It combines with hippuric acid to form the acid salt,  $C_9H_8KNO_3 \cdot C_9H_5NO_3 \cdot H_2O$ , which crystallises in laminæ or quadratic tablets, possessing a satin lustre. They give off 4.77 per cent. of water at  $100^{\circ}$ .

Potassium hippurate may be used in a similar way, and for similar purposes, to the sodium salt.

*Dose.*—3 to 20 decigrams (5 to 30 grains).

## POTASSII HYDROXIDUM.

POTASSIUM HYDROXIDE.

KOH = 56.158. ✓

*Synonyms.*—Potassa; Potassa Caustica; Caustic Potash; Potassium Hydrate.

Potassium hydroxide, KOH, may be prepared by the interaction of potassium carbonate and calcium hydroxide.

It occurs in hard, white, very deliquescent pencils or cakes, breaking with a brittle crystalline fracture, with a faint odour of lye. Powerfully alkaline and corrosive, quickly destroying organic tissues. Exposed to the air it rapidly absorbs moisture and carbon dioxide. Very soluble in water, soluble in alcohol (1 in 2). Its solution in water should leave only a trace of sediment. Determined volumetrically 90 per cent. of potassium hydroxide should be indicated. It should be free from lead, copper, or arsenium.

Potassium hydroxide is a powerful caustic and escharotic, and is used to destroy nævi, and as an application to lupus patches, ulcers, and malignant growths. On account of its tendency to spread over the surrounding tissues, it is usually applied in combination with lime as Vienna paste (see Pasta Potassæ cum Calce). Healthy tissue may be protected by a thick layer of soft paraffin or by adhesive plaster. Aqueous and alcoholic solutions of potassium hydroxide are used as reagents (see Liquor Potassii Hydroxidi).

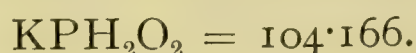
*NOTES.*—Commercial potassium hydroxide of the required official standard contains considerable quantities of chloride, sulphate, and more or less carbonate. A variety described as being "purified by alcohol" is prepared by solution in alcohol,



filtration to remove the less soluble sulphates, chlorides, and carbonates, and evaporation of the filtrate. This always contains more or less chloride, with some alumina and silica. A very pure variety is also obtained by the action of baryta water on potassium sulphate solution. Potassium hydroxide should be kept in well-stoppered bottles. Potassa cum Calce may also be obtained in sticks, for use as a caustic to warts and for obstetric use.

## POTASSII HYPOPHOSPHIS.

POTASSIUM HYPOPHOSPHITE.



Potassium hypophosphite,  $\text{KPH}_2\text{O}_2$ , may be prepared by adding a solution of 5.75 of potassium carbonate in 8 of water to a solution of 6 of calcium hypophosphite in 64 of water; the mixture is allowed to stand until the precipitate of calcium carbonate settles, filtered, and the filtrate evaporated at a temperature not exceeding  $100^\circ$  until granulation is effected. The product may be purified by dissolving in alcohol, evaporating to a syrupy consistence, and crystallising *in vacuo*.

It occurs in white opaque hexagonal plates or crystalline masses, or more usually as a granular powder, odourless, having a pungent, saline, and bitterish taste, and very deliquescent. Soluble in cold water (1 in 0.6), boiling water (1 in 0.3), cold alcohol (1 in 7.5), and boiling alcohol (1 in 3.5), but insoluble in ether. The aqueous solution is neutral, or slightly alkaline to litmus paper. Heated in a dry test-tube the salt first loses water, and then evolves spontaneously inflammable hydrogen phosphide gas, which burns with a bright yellow flame. It reduces solutions of silver nitrate, copper sulphate, and mercuric chloride. On trituration with nitrates, chlorates, and other oxidising agents explosion is liable to occur. Boiled with solution of potassium hydroxide, hydrogen is given off, and phosphate and phosphite of potassium are formed. It is oxidised violently on evaporation with nitric acid. It should be free from arsenium and other metallic impurities, chlorides, carbonates, and sulphites (see Note to Calcii Hypophosphis). The following is said to be the most accurate method of determination:—About 3 decigrams of the dried salt is dissolved in 10 mls of water, 3 mls of a 10 per cent. solution of lead acetate added, and the mixture allowed to stand for twelve hours, filtered, the filtrate acidified with hydrochloric acid, and then saturated with hydrogen sulphide, boiled, filtered, evaporated to a low bulk, oxidised by heating gently for half an hour with 5 mls of hydrochloric acid and 1 gramme of potassium chlorate, concentrated to about 20 mls, and the phosphate finally determined gravimetrically or volumetrically.

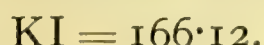
Potassium hypophosphite is used in association with the hypophosphites of calcium and sodium, generally in the form of Syrupus Hypophosphitum Compositus.

*Dose*.—6 to 30 centigrams (1 to 5 grains).



**POTASSII IODIDUM.**

POTASSIUM IODIDE.



Potassium iodide, KI, may be prepared by adding a slight excess of iodine to a strong solution of potassium hydroxide, evaporating the solution of potassium iodide and iodate to dryness, decomposing the iodate by heating the mixture with charcoal and purifying by crystallisation, or it may be prepared by the action of potassium carbonate on ferrous iodide.

It occurs in colourless, translucent, and opaque cubic crystals, having a faint, characteristic odour and a pungent, saline, afterwards bitter, taste. It absorbs moisture slightly. Soluble in water (1 in 0.75), alcohol (1 in 10), and glycerin (1 in 3). The salt decrepitates on heating, fuses at a low red heat, and at a higher temperature volatilises without decomposition. Its aqueous solution may have a faintly alkaline reaction. Determined volumetrically not less than 98 per cent. of potassium iodide should be indicated. It should be free from lead, copper, arsenium, iron, aluminium, calcium, magnesium, sodium, ammonium, bromates, iodates, cyanides, and nitrates, and should not contain more than traces of bromides, chlorides, carbonates, or sulphates.

The action of the iodides closely resembles that of iodine, but they are less irritating to the stomach, and have therefore practically replaced free iodine for internal administration. Potassium iodide is very rapidly absorbed, and can be detected in the saliva and urine a few minutes after ingestion. In large doses it may produce irritation of the stomach, and, after absorption, symptoms of "iodism." This condition is characterised by inflammation and swelling of the nasal, buccal, and respiratory mucous membranes; there is running from the nose, frontal headache, and conjunctivitis. The bronchial secretion is increased and the irritation gives rise to cough. These symptoms are due to excretion of the salt by the mucous membranes, and to some decomposition with liberation of iodine. Potassium iodide is also excreted by the skin, and may cause an acneiform rash resembling that following prolonged use of bromides. The symptoms of iodism frequently disappear on increasing the dose. The mode of action of the iodides is not clearly known. They stimulate the thyroid gland, and are employed on this account in goitre; their action in aneurism and atheroma is also attributed to this effect, and their usefulness in the treatment of obesity may, by the resulting increased metabolism, be similarly explained. They have a specific effect in tertiary syphilis, and their employment results in the absorption of gummata. Iodides are used in the treatment of mercury and lead poisoning to assist in the elimination of these metals. They are employed in chronic rheumatism, in enlarged lymphatic glands, both externally and internally, and to promote absorption of serous effusions. The iodides are of value in some forms of asthma; they may act by increasing the nasal

and bronchiolar mucus. Potassium iodide is given in solution in mixture form, the taste being disguised with tincture of orange or other bitter. It should not be prescribed in tablets, as they cause pain in the stomach during solution. Externally, it is applied as Unguentum Potassii Iodidi and Linimentum Potassii Iodidi cum Sapone, for enlarged glands, and to rub over painful or swollen joints. It is incompatible with spirit of nitrous ether, tincture of perchloride of iron, and bismuth salts. The ordinary maximum dose is often largely exceeded in tertiary syphilis.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

*NOTE.*—Solution of potassium iodide is a 10 per cent. w/v aqueous solution of the salt.

### POTASSII LACTAS.

POTASSIUM LACTATE.



Potassium lactate,  $\text{KC}_3\text{H}_5\text{O}_3$ , may be prepared by diluting lactic acid with water, and neutralising with solution of potassium carbonate, or by double decomposition calcium lactate and potassium carbonate, filtering, and evaporating until aqueous vapour ceases to be given off. It may finally be precipitated in a solid form from its alcoholic solution by ether, but it soon becomes syrupy again.

It occurs as a colourless or yellowish syrupy liquid, or as an amorphous mass when precipitated by ether. It has never been obtained in a crystalline condition; very hygroscopic, soluble in water and in alcohol, insoluble in ether.

Potassium lactate is for the most part oxidised in the tissues to carbonate, thus resembling other organic salts of the alkalies. It has been recommended for use in gout and rheumatism to increase the alkalinity of the blood and urine. Lactates behave like butyrates in limiting nitrogenous waste.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

### POTASSII NITRAS.

POTASSIUM NITRATE.



*Synonyms.*—Nitre; Saltpetre.

Potassium nitrate,  $\text{KNO}_3$ , may be obtained by the interaction of sodium nitrate and potassium chloride, or by the purification of crude nitre by solution in water and recrystallisation.

It occurs in colourless, transparent masses of six-sided rhombic prisms or as a white crystalline powder, odourless, and having a cooling, pungent, and saline taste. Soluble in cold water (1 in 4), and in boiling water (10 in 4), very sparingly soluble in alcohol. The aqueous solution is neutral to litmus. When heated to  $353^\circ$  the salt melts. At a higher temperature it is decomposed, giving off oxygen, and then some of its nitrogen, leaving a residue of potassium nitrate, nitrite, and oxide. In contact with red hot carbon it defla-



grates. It should be free from lead, copper, arsenium, iron, aluminium, zinc, calcium, magnesium, sodium, ammonium, iodides, and sulphates, but always contains traces of chlorides.

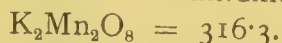
Potassium nitrate, given internally, has a marked salt-action, causing an increased flow of urine, and in large doses, irritation of the kidney and gastro-intestinal tract. It is employed as a diuretic but is better avoided when there is inflammation of the stomach, kidneys, or bladder. It is used in gargles with potassium chlorate for inflamed throats, and nitre or saltpetre "balls" (*Sal Prunella*) are sucked for a similar purpose; its value probably depends on its mild expectorant action. Blotting-paper saturated with a strong solution of nitre and dried is burned and the fumes inhaled for asthma (see *Charta Nitrata*). The smoke is stated to contain pyridine compounds and potassium nitrite. Asthma powders for burning also contain potassium nitrate, usually with stramonium, lobelia, etc. (see *Pulvis Lobeliæ Compositus* and *Pulvis Stramonii Compositus*). Potassium nitrate should be administered internally in dilute solution.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

*Nores*.—The ordinary potassium nitrate of commerce contains traces of chlorides. Potassium nitrite,  $\text{KNO}_2$  (=85.16), occurs as a white, deliquescent, crystalline powder, or in sticks. It is soluble in water, and has been used as a vaso-dilator. *Dose*, 15 to 90 milligrams ( $\frac{1}{4}$  to  $1\frac{1}{2}$  grains).

## POTASSII PERMANGANAS.

### POTASSIUM PERMANGANATE.



Potassium permanganate,  $\text{K}_2\text{Mn}_2\text{O}_8$ , may be obtained by the interaction of potassium chlorate, manganese dioxide, and potassium hydroxide.

It occurs in dark purple, slender, prismatic, iridescent crystals, odourless and having a taste at first sweet, but afterwards disagreeable and astringent. The crystals should be dry and the aqueous solution without action on litmus. The salt, when heated, decrepitates at a temperature of  $240^\circ$ , decomposes, giving off oxygen and leaving a residue from which water extracts potassium hydroxide. Soluble in water (1 in 18), in boiling water (1 in 3). The colour of the aqueous solution is discharged by ferrous sulphate, oxalic acid, alcohol, glycerin, and other easily oxidisable substances, especially if the solution be first acidified by sulphuric acid. Determined volumetrically not less than 98 per cent. of potassium permanganate should be indicated. It should be free from lead, arsenium, iron, aluminium, calcium, magnesium, sodium, ammonium, carbonates, chlorides, and sulphates.

Potassium permanganate owes its disinfectant, deodorant, and bactericidal properties to its capacity for parting with oxygen to albumen or other organic matter, and it acts much more effectively in acid solutions. The oxidising action is lost as soon as the permanganate is reduced, and its effect is therefore fugitive. Solutions are powerful disinfectants within this limitation, and are employed to

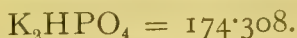


destroy infective material, as a cleansing application to foul ulcers (1 in 1000), as a gargle, mouth-wash, or vaginal injection (1 in 5000) as an injection in gonorrhœa (1 in 2000). They stain the skin and mucous membranes a brown colour. Potassium permanganate is given internally in chlorosis and amenorrhœa, its action being that of the oxide of manganese, which results from reduction of the salt. It destroys morphine by oxidation, and is given internally in morphine and opium poisoning. It also destroys snake venom, and in cases of snake-bite the salt should be rubbed freely into the wound and a solution injected round the site of puncture. Solutions containing 5 per cent. or more have a powerful styptic action. The permanganate is usually administered in pill form, the pills being prepared with kaolin mass, without the addition of any organic material. Solutions of the salt have a disagreeable taste and sometimes irritate the stomach. Potassium permanganate is incompatible with all organic substances, with reducing agents and hydrogen peroxide.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

### POTASSII PHOSPHAS.

POTASSIUM PHOSPHATE.



*Synonyms.*—Dipotassium Hydrogen Phosphate.

Potassium phosphate,  $\text{K}_2\text{HPO}_4$ , may be prepared by mixing phosphoric acid with a sufficient quantity of potassium hydroxide or carbonate so as to produce a slightly alkaline reaction, filtering, and evaporating.

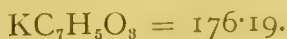
It occurs in irregular masses, or as a granular, deliquescent powder. Very soluble in water, insoluble in alcohol. It is converted at a red heat into pyrophosphate.

Potassium phosphate is a saline purgative resembling sodium phosphate in its action.

*Dose.*—6 to 20 decigrams (10 to 30 grains).

### POTASSII SALICYLAS.

POTASSIUM SALICYLATE.



Potassium salicylate,  $\text{C}_6\text{H}_4\text{OHCO}_2\text{K}$ , may be obtained by neutralising a hot solution of salicylic acid with a solution of potassium carbonate, allowing it to remain finally very faintly acid, filtering, evaporating to dryness, extracting the residue with boiling strong alcohol, and allowing to crystallise.

It occurs in the form of brilliant, colourless, silky needles, or as a white crystalline powder. Easily soluble in water, and in alcohol. Heated to  $210^\circ$  to  $220^\circ$  it decomposes quantitatively into dipotassium

parahydroxybenzoate, phenol, and carbon dioxide. In presence of excess of potassium hydroxide this change does not take place. Treated with bromine, in excess of potassium hydroxide, it yields a red substance like antimony sulphide, insoluble in alcohol, ammonia, and potassium hydroxide. For general tests see under Sodii Salicylas.

Potassium salicylate has properties closely resembling those of sodium salicylate, and is used similarly.

*Dose.*—3 to 20 decigrams (5 to 30 grains).

## POTASSII SULPHAS.

POTASSIUM SULPHATE.



*Synonym.*—Sal Polychrestum.

Potassium sulphate,  $\text{K}_2\text{SO}_4$ , may be obtained by purifying the crude salt formed as a by-product in many chemical operations, or by the interaction of sulphuric acid and potassium chloride or some other salt of potassium.

It occurs in colourless, transparent, hard, rhombic prisms terminated by six-sided pyramids, or as a white powder, without odour, and having a somewhat bitter, saline taste. When heated it decrepitates. At a bright red heat it fuses, and at a white heat is partially decomposed. Soluble in cold water (1 in 10), in boiling water (1 in 4), insoluble in alcohol. The aqueous solution is neutral to litmus. Determined gravimetrically not less than 99 per cent. of potassium sulphate should be indicated. Potassium sulphate should be free from lead, copper, arsenium, iron, aluminium, zinc, calcium, magnesium, sodium, ammonium, and nitrates, and should not contain more than traces of chlorides.

Potassium sulphate is a saline purgative closely resembling sodium sulphate in its action: it acts in virtue of the fact that the  $\text{SO}_4$  ion is not absorbed. It should be given freely diluted, as strong solutions are irritating to the stomach and intestines.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  grammes (10 to 40 grains).

## POTASSII TARTRAS.

POTASSIUM TARTRATE.



*Synonym.*—Normal Potassium Tartrate.

Potassium tartrate,  $(\text{K}_2\text{C}_4\text{H}_4\text{O}_6)_2, \text{H}_2\text{O}$ , may be obtained by neutralising acid potassium tartrate with potassium carbonate.

It occurs in small colourless, translucent, four or six sided prisms, or as a white, crystalline, slightly deliquescent powder, with a saline, bitter taste. When heated on platinum foil it chars and gives off inflammable vapours having the odour of burnt sugar. At a higher temperature the carbon is burned off and a white fused mass of potassium carbonate remains. Soluble in water (1 in 0.6);

insoluble in alcohol. The aqueous solution has no action on litmus. On incineration and subsequent volumetric determination of the carbonate, 99 per cent. of potassium tartrate of the above formula should be indicated. Potassium tartrate should be free from lead, copper, iron or carbonates, and should contain not more than traces of calcium, magnesium, sodium, chlorides, or sulphates.

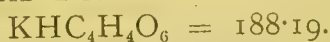
Potassium tartrate is a typical saline cathartic, causing watery stools without pain or irritation (see *Magnesii Sulphas*). The tartrates of the alkalies are less readily absorbed than the citrates; their purgative action is therefore more marked, whilst their action as diuretics and as antacids in rendering the urine alkaline is less pronounced.

*Dose.*—2 to 16 grammes (30 to 240 grains).

*NOTES.*—This salt is officially represented as containing twice as much water of crystallisation as is actually present; the correct formula is as here given, and allowance must be made for the discrepancy in the official titration test for purity.

### POTASSII TARTRAS ACIDUS.

ACID POTASSIUM TARTRATE.



*Synonyms.*—Potassii Bitartras; Potassium Bitartrate; Bitartrate of Potassium; Purified Cream of Tartar.

Acid potassium tartrate,  $\text{KHC}_4\text{H}_4\text{O}_6$ , is obtained from the crude tartar or argol, which is deposited from grape juice, and also found in the lees of wine; it is also prepared from tartaric acid by precipitation with potassium carbonate.

It occurs as a gritty, white, crystalline powder, or colourless, slightly opaque masses of crystals; odourless, and having a pleasant acidulous taste. Soluble in water (1 in 200), in boiling water (1 in 16), insoluble in alcohol. The aqueous solution has an acid reaction. Determined volumetrically not less than 97.5 per cent. of acid potassium tartrate should be indicated. It should be free from lead, arsenium, copper, or iron, and should not contain more than traces of calcium, magnesium, sodium, chlorides, or sulphates.

Potassium acid tartrate has an action identical with that of potassium tartrate. It is largely employed in febrile and dropsical conditions, and with sulphur (see *Confectio Sulphuris*) is a favourite laxative in hæmorrhoids. A dilute solution forms a pleasant drink for those suffering from chronic Bright's disease. A solution of potassium acid tartrate, for use as a reagent, is prepared by digesting excess of the salt in distilled water, and filtering the liquid before use.

*Dose.*— $1\frac{1}{2}$  to 4 grammes (20 to 60 grains).

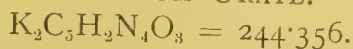
*NOTES.*—Acid phosphates (chiefly calcium) are used as substitutes for cream of tartar in baking, and the Pharmacopœia of the United States describes a special test for phosphates, probably with the object of detecting this possible sophistication or adulteration. Soluble cream of tartar (*Potassii Borotartras* or *Tartarus Boraxatus*) occurs usually in colourless scales, and is soluble in its own weight of water; it is obtained by dissolving 5 of potassium acid tartrate and 2 of borax in water, by the aid of heat, and evaporating the solution to dryness.

*Dose.* 12 to 24 decigrams (20 to 40 grains).



**POTASSII URAS.**

POTASSIUM URATE.



Potassium urate,  $\text{K}_2\text{C}_5\text{H}_2\text{N}_4\text{O}_8$ , may be prepared by saturating a cold diluted solution of potassium hydroxide, free from carbonate, with uric acid suspended in water, then concentrating the solution by boiling in a retort to prevent absorption of carbon dioxide. At a certain degree of concentration the salt is deposited in a crystalline state. The solution is allowed to stand for some time, the liquid decanted, and the crystals washed first with weak alcohol, and afterwards with stronger alcohol.

It occurs in the form of fine anhydrous needles or as a white crystalline powder, having a strong alkaline reaction and a caustic taste, and it absorbs carbon dioxide from the air. Soluble in cold water (1 in 44), in boiling water (1 in 35), gradually decomposed by boiling, with formation of the acid salt. At  $150^\circ$  it darkens and melts; at a higher temperature it is decomposed. The acid salt,  $\text{KC}_5\text{H}_3\text{N}_4\text{O}_8$  ( $=154.214$ ), is precipitated in a granular form by passing carbon dioxide through a solution of the neutral salt. It is soluble in cold water (1 in 800), in boiling water (about 1 in 80), from which solution it is deposited on cooling in amorphous flakes.

Potassium urate is not employed for medicinal purposes.

**PRUNI VIRGINIANÆ CORTEX.**

WILD CHERRY BARK.

*Synonyms.*—*Prunus Virgiana*; Wild Cherry; Virginian Prune Bark.

Wild cherry bark is obtained from the wild or black cherry, *Prunus serotina*, Ehrh. (N.O. Rosaceæ), incorrectly called Virginian prune, a tree widely distributed in America. The bark is collected in the autumn, when it is most active, preferably from young stems and branches.

The bark occurs in flattened, curved, or recurved pieces, about 2 millimetres in thickness, sometimes 12 centimetres long and 5 centimetres broad, but usually smaller. The young bark is often covered with a thin, smooth, glossy, reddish-brown cork, marked with tangentially elongated, whitish lenticels, which can easily be removed in thin strips, disclosing the greenish-brown cortex. On the inner surface the bark is of a cinnamon-brown colour, with fine longitudinal striations. The fracture is short and granular, the fractured surface being of a reddish-grey colour, and exhibiting numerous pale red medullary rays, alternating with bast rays. The odour of the bark, which is intensified on moistening, resembles that of bitter almonds; the taste is similar, and also bitter.

The drug contains an amorphous glucoside resembling laurocerasin and an enzyme allied to but not identical with emulsin. By the interaction of these two bodies in the presence of water, benzalde-

hyde, hydrocyanic acid, and dextrose are produced, good specimens of drug yielding from 0·12 to 0·16 per cent. of hydrocyanic acid. The bark also contains a bitter, crystalline glucoside to which the bitter taste is due, and tannin, together with starch, resin, etc. Young bark is more active than the thick bark from old stems. It yields on incineration from 3 to 6 per cent. of ash.

Preparations of wild cherry bark are employed as mild sedatives to relieve cough; their action is principally due to the small quantity of hydrocyanic acid they contain. A tincture and syrup are prepared, the latter is a pleasant flavouring agent for cough mixtures.

*Dose*.—1 to 2 grammes (15 to 30 grains).

*NOTES*.—The bark of other North American species of *Prunus* is occasionally sold as wild cherry bark. The genuine is well characterised by the presence of stone cells and absence of bast fibres, by the short granular fracture and by the characteristic taste. Other prune barks are more astringent, or more fibrous or devoid of the bitter almond taste, etc.

## PRUNUM.

### PRUNES.

*Synonyms*.—Pruni; French. Plums.

Prunes are the dried ripe fruits of *Prunus domestica*, Linn., var. *Juliana*, DC. (N.O. Rosaceæ), obtained from trees cultivated in France. The fruit is collected when ripe, and dried partly by the sun and partly by artificial heat.

They are of an irregular flattened, ovoid shape, about 3 centimetres long, are black in colour, and have a shrivelled surface. The pulp is brownish, and surrounds a hard, flattened, oval stone, which is rounded at one end, and marked at the other with a shallow depression. The seed has a taste resembling that of bitter almonds, the pulp being sweet and acidulous.

The pulp is the only part of the fruit used in medicine, and the chief constituents are about 40 per cent. of dextrose and about 2 per cent. of vegetable acids. It contains about 30 per cent. of water and yields from 1 to 2 per cent. of ash.

Prunes are mildly laxative, nutritious, and demulcent. They are employed in the preparation of confection of senna and other laxative confections.

## PTEROCARPI LIGNUM.

### RED SANDERS WOOD.

*Synonyms*.—Santalum Rubrum; Red Saunders; Red Sandal Wood.

Red sanders wood is the heartwood of *Pterocarpus santalinus*, Linn. f. (N.O. Leguminosæ), a small tree indigenous to India.

The wood is imported in irregular billets, which have been deprived of their bark and sapwood. They are of a deep red colour, the

transverse section exhibiting alternating darker and lighter zones. The wood is hard, and for pharmaceutical use is generally obtained as a coarse powder, or in small, hard, splintery raspings. It is almost odourless, and has a somewhat astringent taste. The red colouring matter is only slightly soluble in water, but is soluble in alcohol, ether, acetic acid, and alkaline solutions.

The chief constituent of the wood is the red colouring matter, santalin (santalic acid), which forms microscopic prisms, melting at  $104^{\circ}\text{C}$ . It is insoluble in water, but yields a blood-red solution with alcohol, yellow with ether, and violet with ammonia and caustic alkalies. The wood also contains pterocarpin and homopterocarpin, two colourless, crystalline substances. It yields from 1 to 2 per cent. of ash on incineration.

Red sanders wood is employed solely for its colouring matter which is precipitated by mineral acids.

## PULSATILLA.

### PULSATILLA.

*Synonym.*—Pasque Flower.

*Pulsatilla* consists of the dried herb, *Anemone Pulsatilla*, Linn. (N.O. Ranunculaceæ), a plant indigenous to Great Britain.

The herb possesses a stout, somewhat woody rhizome, producing a rosette of stalked leaves and an erect scape bearing a whorl of three bracteoles, which form an involucre below the solitary terminal flower. The leaves are bipinnate, the ultimate lobes being linear, and the petioles often purplish. The flower possesses six light purple sepals, silky on the outside, and bracteoles divided to the base in linear segments. The fruits are small brown, hairy achenes with long (3.5 Cm.) feathery tails. The whole plant, especially the bases of the petioles, is clothed with silky hairs. Odourless, but possessing when fresh a very acrid taste, which is less conspicuous in the dried herb, and gradually diminishes on keeping.

The chief active constituent of *pulsatilla* is a crystalline camphor, soluble in ether and chloroform, which possesses vesicant properties, and gives off an intensely irritating vapour. It is found, together with anemonin, in the aqueous distillate from the fresh herb. It is slowly converted, especially in the presence of water, into acrid crystalline anemonin and tasteless crystalline isoanemonic acid. Anemonin is crystalline, tasteless, and odourless when pure, melts at  $152^{\circ}$ , and then possesses a burning taste. It is volatile in water vapour, and is then irritating to the eyes and mouth.

The action of *pulsatilla* is virtually that of the crystalline substance anemonin, which is a powerful irritant like cantharides, an overdose causing violent gastro-enteritis, hæmaturia, and later anuria. It has been given as a "sedative" in dysmenorrhœa, and for the relief of headache and neuralgia. There is no reliable evidence of its value. The dose of anemonin is from 1 to 4 milligrams



( $\frac{1}{60}$  to  $\frac{1}{15}$  grain). A tincture of pulsatilla is prepared, and recommended for use in dysmenorrhœa and amenorrhœa, in small doses frequently repeated.

### PULVIS ACACIÆ COMPOSITUS.

#### COMPOUND ACACIA POWDER.

Gum Acacia, in powder	...	...	...	50'00
Tragacanth, in powder	...	...	...	50'00

Mix the powders intimately.

This mixture of gums is used sparingly as an absorbent pill excipient.

### PULVIS ACETANILIDI COMPOSITUS.

#### COMPOUND ACETANILIDE POWDER.

Acetanilide	...	...	...	...	70'00
Caffeine	...	...	...	...	10'00
Sodium Bicarbonate	...	...	...	...	20'00

Mix the caffeine and sodium bicarbonate with the acetanilide.

This powder is employed in neuralgia, dysmenorrhœa, and other nervous affections.

*Dose.*—I to 3 decigrams (3 to 5 grains).

*NOTE.*—This preparation corresponds to Pulvis Acetanilidi Compositus, U.S.P., and resembles many advertised "headache cures."

### PULVIS ACIDI BORICI ET AMYLI.

#### BORIC ACID AND STARCH POWDER.

Boric Acid, in fine powder	...	...	...	50'00
Starch, in powder	...	...	...	50'00

Mix the powders intimately.

This preparation is used as a dusting powder to prevent chafing, bed-sores, etc.

### PULVIS ACIDI SALICYLICI COMPOSITUS.

#### COMPOUND SALICYLIC ACID POWDER.

*Synonyms.*—Pulvis pro Pedibus; Foot Powder.

Salicylic Acid	...	...	...	...	3'00
Boric Acid, in fine powder	...	...	...	...	10'00
French Chalk, in fine powder	...	...	...	...	87'00

Mix the acids with the French chalk.

This preparation is used as a dusting powder for the feet when there is tenderness or hyperidrosis.

*NOTE.*—This preparation resembles Pulvis Salicylicus cum Talco of the German Pharmacopœia, which contains wheaten starch in place of the boric acid.

**PULVIS ALKALINA COMPOSITA.**

## COMPOUND ALKALINE POWDER.

Sodium Bicarbonate	...	...	...	...	35'00
Sodium Chloride	...	...	...	...	35'00
Borax, in powder	...	...	...	...	30'00

Mix the powders intimately.

This powder is used to make a wash for the nose in catarrh, 2 to 4 grammes (30 to 60 grains) being dissolved in 300 mls (10 fluid ounces) of warm water.

**PULVIS ALOES ET CANELLÆ.**

## ALOE AND CANELLA POWDER.

*Synonym.*—Hiera Picra.

Socotrine Aloes, in powder	...	...	...	80'00
Canella Bark, in powder	...	...	...	20'00

Mix the powders intimately.

This powder is employed as a purgative and emmenagogue.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

**PULVIS AMYGDALÆ COMPOSITUS.**

## COMPOUND ALMOND POWDER.

*Synonym.*—Compound Powder of Almonds.

Sweet Almonds, freshly blanched	...	...	...	62'00
Refined Sugar, in powder	...	...	...	31'00
Gum Acacia, in powder	...	...	...	7'75

Dry the freshly blanched almonds and reduce them to a smooth consistence by rubbing them lightly in a mortar until as smooth as possible; then add gradually the sugar and gum acacia previously mixed, so as to produce a coarse powder.

This mixture is used as an emulsifying agent.

**PULVIS ANTIMONIALIS.**

## ANTIMONIAL POWDER.

*Synonym.*—Pulvis Antimonii Compositus.

Antimonious Oxide	...	...	...	...	33'33
Calcium Phosphate	...	...	...	...	66'66

Mix the powders intimately.

*Dose.*—2 to 4 decigrams (3 to 6 grains).

*NOTE.*—Pulvis Antimonialis is the modern representative of Pulvis Antimonii Compositus, P.L., 1851, the calcium phosphate being added to represent that formed in the original from hartshorn. A preparation similar to this is James Fever Powder (Pulvis Jacobi or Pulvis Febrifugus Jacobi) which was originally prepared by calcining a mixture of equal parts of antimony sulphide and hartshorn shavings.

**PULVIS AROMATICUS COMPOSITUS.**

## COMPOUND AROMATIC POWDER.

Cinnamon Bark, in powder	...	...	...	10·66
Nutmeg, in powder	...	...	...	8·00
Saffron, in powder	...	...	...	8·00
Cloves, in powder	...	...	...	4·00
Cardamom Seeds, in powder	...	...	...	2·66
Refined Sugar	...	...	...	66·66

Mix thoroughly and pass through a fine sieve ; then rub lightly in a mortar and place in a stoppered bottle. If a product of bright colour be desired, the saffron may previously be moistened and triturated with a little water or spirit, or the fresh and slightly damp mixture may be subjected to considerable pressure during the process of trituration.

The properties of this preparation resemble those of *Confectio Aromatica*.

*Dose*.— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

*Notes*.—This preparation represents *Pulvis Aromaticus*, B.P., 1864 ; if  $29\frac{1}{3}$  of prepared chalk be added to it, *Pulvis Cretæ Aromaticus*, B.P. 1885, will be produced.

**PULVIS BUTEÆ SEMINUM.**

## POWDERED BUTEA.

*Synonym*.—Powder of Butea Seeds.

Powdered butea is prepared by soaking the seeds in water so that the kernels can be separated from the integuments, and powdered.

This powder is official in India and the Eastern Colonies for use as an anthelmintic ; it is also a mild laxative, and is said to cause vomiting occasionally.

*Dose*.—6 to 12 decigrams (10 to 20 grains).

**PULVIS CALOMELANOS ET ACIDI BORICI.**

## CALOMEL AND BORIC ACID POWDER.

Mercurous Chloride	...	...	...	25·00
Boric Acid, in powder	...	...	...	75·00

Mix the powders intimately.

This preparation is used as a dusting powder for syphilitic sores, ulcers, and pruritus ani.

**PULVIS CALOMELANOS ET AMYLI.**

## CALOMEL AND STARCH POWDER.

Mercurous Chloride	...	...	...	25·00
Starch, in powder	...	...	...	75·00

Mix the powders intimately.

This preparation is used as a dusting powder.



**PULVIS CALOMELANOS ET ZINCI OXIDI.**

CALOMEL AND ZINC OXIDE POWDER.

Mercurous Chloride	...	...	...	...	25'00
Zinc Oxide	...	...	...	...	75'00

Mix the powders intimately.

This preparation is used as a dusting powder.

**PULVIS CATECHU COMPOSITUS.**

COMPOUND CATECHU POWDER.

*Synonym.*—Compound Powder of Catechu.

Catechu, in powder	...	...	...	...	40'00
Kino, in powder	...	...	...	...	20'00
Krameria Root, in powder	...	...	...	...	20'00
Cinnamon Bark, in powder	...	...	...	...	10'00
Nutmeg, in powder	...	...	...	...	10'00

Mix the powders intimately.

This preparation is employed in diarrhœa, in powders, cachets, or in mixture form.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  grammes (10 to 40 grains).**PULVIS CINNAMOMI COMPOSITUS.**

COMPOUND CINNAMON POWDER.

*Synonyms.*—Compound Powder of Cinnamon; Pulvis Aromaticus.

Cinnamon Bark, in powder	...	...	...	...	33'33
Cardamom Seeds, in powder	...	...	...	...	33'33
Ginger, in powder	...	...	...	...	33'33

Mix the powders intimately.

This preparation is employed in powders, cachets, or in mixture form, as a gastro-intestinal carminative and in the treatment of diarrhœa.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  grammes (10 to 40 grains).

NOTES.—The official synonym for this preparation renders it liable to be confused with Pulvis Aromaticus Compositus, or Pulvis Aromaticus, B.P., 1864. Pulvis Aromaticus, U.S.P., is prepared by mixing 35 each of Saigon cinnamon and ginger with 15 each of cardamom and nutmeg, all in fine powder. The average dose of this aromatic powder is 1 gramme (15 grains).

**PULVIS CRETÆ AROMATICUS.**

AROMATIC CHALK POWDER.

*Synonym.*—Aromatic Powder of Chalk.

Cinnamon Bark, in powder	...	...	...	...	8'80
Nutmeg, in powder	...	...	...	...	6'60
Cloves, in powder	...	...	...	...	3'30
Cardamom Seeds, in powder	...	...	...	...	2'20
Refined Sugar, in powder	...	...	...	...	55'00
Prepared Chalk	...	...	...	...	24'20

Mix the powders intimately.

The properties of this preparation resemble those of Confectio Aromatica, from which the powder should be carefully distinguished,

as it contains no saffron. It is used chiefly for treating the diarrhœa of children.

*Dose.*— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

NOTE.—*Pulvis Cretæ Aromaticus*, B.P., 1885, contained in addition about 6 per cent. of saffron (see notes under *Pulvis Aromaticus Compositus*).

### PULVIS CRETÆ AROMATICUS CUM OPIO.

AROMATIC CHALK POWDER WITH OPIUM.

*Synonym.*—Aromatic Powder of Chalk with Opium.

Aromatic Powder of Chalk	...	...	...	97.50
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Opium, in powder	...	...	...	2.50
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Mix the opium intimately with the aromatic powder of chalk. It is more powerful than the simple chalk powder, owing to the opium it contains.

*Dose.*—6 to 25 decigrams (10 to 40 grains).

NOTE.—*Pulvis Cretæ Aromaticus cum Opio* contains  $2\frac{1}{2}$  per cent. of opium.

### PULVIS CRETÆ COMPOSITUS.

COMPOUND CHALK POWDER.

Prepared Chalk	...	...	...	30.00
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Gum Acacia, in fine powder	...	...	...	20.00
----------------------------	-----	-----	-----	-------

Refined Sugar, in fine powder	...	...	...	50.00
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Mix the powders intimately.

This powder is used for the extemporaneous preparation of *Mistura Cretæ*, U.S.P., 20 of the powder being triturated with 40 of cinnamon water, and sufficient plain water added to make the product measure 100.

*Dose.*—1 to 2 grammes (15 to 30 grains).

### PULVIS DUODENALIS.

DUODENAL POWDER.

Duodenal powder is prepared by cleansing the upper portion of the fresh duodenum of the pig, *Sus scrofa*, Linn. (Order Ungulata), removing the duodenal membrane by scraping with a blunt knife, scaling the membrane on glass plates at 70° to 80°, powdering the scales when dry, mixing the powder with one-fourth its weight of calcium phosphate, and passing the mixture through a No. 60 sieve.

It occurs as a light, greyish-brown, hygroscopic powder, with a slight odour suggesting that of cooked meat and a slightly saline taste.

Duodenal powder contains secretin, the active principle of the mucous membrane of the duodenum, and is employed as a pancreatic stimulant, in cases where there appears to be deficient pancreatic secretion. The secretin does not occur as such, but in some antecedent form (prosecretin). The addition of any dilute acid, such as 0.4 per cent. of hydrochloric acid, readily liberates the secretin.

It is usually given with 3-decimil (5-minim) doses of diluted hydrochloric acid.

*Dose*.—2 to 6 decigrams (3 to 10 grains).

*NOTE*.—This preparation must be kept in well-corked or stoppered bottles, and it will then retain its properties for some time.

### PULVIS ELATERINI COMPOSITUS.

COMPOUND ELATERIN POWDER.

*Synonym*.—Compound Powder of Elaterin.

Elaterin, in fine powder	...	...	...	2.50
Milk Sugar, in fine powder	...	...	...	97.50

Mix the powders intimately by trituration.

This preparation is a drastic, hydragogue cathartic, and should be used with caution.

*Dose*.— $\frac{1}{2}$  to  $2\frac{1}{2}$  decigrams (1 to 4 grains).

*NOTES*.—Trituratio Elaterini, U.S.P., is prepared by adding 10 of elaterin to 90 of milk sugar in moderately fine powder, and mixing intimately by trituration. The average dose of this trituration of elaterin is 30 milligrams ( $\frac{1}{2}$  grain). Other triturations may be prepared in a similar way, and of the same strength.

### PULVIS GLYCYRRHIZÆ COMPOSITUS.

COMPOUND LIQUORICE POWDER.

*Synonym*.—Compound Powder of Liquorice.

Senna, in fine powder	...	...	...	16.00
Liquorice Root, in fine powder	...	...	...	16.00
Fennel Fruit, in fine powder	...	...	...	8.00
Sublimed Sulphur, sifted	...	...	...	8.00
Refined Sugar, in powder	...	...	...	48.00

Mix the powders intimately.

This preparation is a mild laxative suitable for the use of children and delicate persons.

*Dose*.—4 to 8 grammes (60 to 120 grains).

*NOTE*.—Pulvis Glycyrrhizæ Compositus, U.S.P., is prepared by mixing 18 of senna, 23.6 of liquorice root, 8 of washed sulphur, 0.4 by weight of oil of fennel, and 50 of refined sugar.

### PULVIS HYDRARGYRI SUBCHLORIDI COMPOSITUS.

COMPOUND MERCUROUS CHLORIDE POWDER.

*Synonyms*.—Pulvis Basilicus; Compound Calomel Powder.

Mercurous Chloride	...	...	...	25.00
Scammony, in powder	...	...	...	25.00
Acid Potassium Tartrate	...	...	...	25.00
Jalap, in powder	...	...	...	8.25
Antimonial Powder	...	...	...	8.25
Ginger, in powder, sufficient to produce	...	...	...	100.00

Mix the powders intimately.

This preparation is an aperient and intestinal disinfectant for use in the mild febrile disorders of children.

*Dose*.— $2\frac{1}{2}$  to 5 decigrams (4 to 8 grains), according to the age of the child.



**PULVIS IODOFORMI ET ACIDI BORICI.**

ODOFORM AND BORIC ACID POWDER.

Iodoform, in powder	...	...	...	25'00
Boric Acid, in powder	...	...	...	75'00

Mix the powders intimately.

This preparation is used as a dusting powder for wounds, ulcers, etc.

**PULVIS IPECACUANHÆ COMPOSITUS.**

COMPOUND IPECACUANHA POWDER.

*Synonyms.*—Compound Powder of Ipecacuanha; Pulvis Doveri; Dover's Powder.

Ipecacuanha Root, in powder	...	...	...	10'00
Opium, in powder	...	...	...	10'00
Potassium Sulphate, in powder	...	...	...	80'00

Mix the powders intimately.

This preparation is employed as a diaphoretic in incipient colds, as an anodyne in gastric pain, and to control dysentery and diarrhœa.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

*NOTES.*—This preparation contains 10 per cent. of opium. Pulvis Ipecacuanhæ et Opii, U.S.P., is of the same strength, but contains milk sugar in place of the potassium sulphate.

**PULVIS IPECACUANHÆ SINE EMETINA.**

DE-EMETINISED IPECACUANHA POWDER.

De-emetinised ipecacuanha powder is prepared by extracting powdered ipecacuanha root with ammoniated chloroform, and shaking out the chloroformic solution with acidulated water; then separating, and adding the chloroformic liquid to the ~~extractive~~, which is finally dried and powdered.

This preparation is stated to be efficacious in the treatment of dysentery, without causing vomiting.

*Dose.*— $\frac{1}{2}$  to 2 grammes (8 to 30 grains).

**PULVIS JALAPÆ COMPOSITUS.**

COMPOUND JALAP POWDER.

*Synonym.*—Compound Powder of Jalap.

Jalap, in powder	...	...	...	33'33
Acid Potassium Tartrate, in powder	...	...	...	60'00
Ginger, in powder	...	...	...	6'66

Mix the powders intimately.

This preparation is a hydragogue cathartic employed in dropsy, and chronic Bright's disease.

*Dose.*—1 to 4 grammes (20 to 60 grains).

*NOTE.*—Pulvis Jalapæ Compositus, U.S.P., is a mixture of 35 of jalap and 65 of acid potassium tartrate.

**PULVIS KALADANÆ COMPOSITUS.**

COMPOUND KALADANA POWDER.

*Synonym.*—Compound Powder of Kaladana.

Kaladana, in powder	...	...	...	...	33'33
Acid Potassium Tartrate, in powder	...	...	...	...	60'00
Ginger, in powder	...	...	...	...	6'66

Mix the powders intimately.

This preparation is official in India and the Eastern Colonies for use in place of compound powder of jalap.

*Dose.*—1·5 to 4 grammes (20 to 60 grains).**PULVIS MAGNESIÆ BOROCITRATIS COMPOSITUS.**

COMPOUND MAGNESIUM BOROCITRATE POWDER.

Magnesium Borocitrate	...	...	...	...	33'33
Refined Sugar, in powder	...	...	...	...	66'66

Mix the powders intimately.

This preparation is employed as a urinary antiseptic, and in gout and rheumatism. It is sometimes given forty-eight hours before operations upon the urinary tract to sterilise the urine.

*Dose.*—2 to 4 grammes (30 to 60 grains).**PULVIS KINO COMPOSITUS.**

COMPOUND KINO POWDER.

*Synonym.*—Compound Powder of Kino.

Kino, in powder	...	...	...	...	75'00
Opium, in powder	...	...	...	...	5'00
Cinnamon Bark, in powder	...	...	...	...	20'00

Mix the powders intimately.

This preparation is employed as an astringent in diarrhœa.

*Dose.*—3 to 12 decigrams (5 to 20 grains).*NOTE.*—This preparation contains 5 per cent. of opium.**PULVIS LOBELIÆ COMPOSITUS.**

COMPOUND LOBELIA POWDER.

*Synonym.*—Asthma Powder.

Lobelia, in powder	...	...	...	...	25'00
Stramonium Leaves, in powder	...	...	...	...	25'00
Potassium Nitrate	...	...	...	...	25'00
Oil of Anise	...	...	...	...	0'10
Distilled Water, boiling	...	...	...	...	25'00
Tea Leaves, in powder, sufficient to produce	...	...	...	...	100'00

Dissolve the potassium nitrate in the water, add the solution to the mixed powders, mix thoroughly, dry, and add the oil of anise.

This powder is used for asthma, half a teaspoonful or more being burned, and the fumes inhaled several times daily, or as required. Pulvis Stramonii Compositus is a similar preparation.

**PULVIS MENTHOLIS COMPOSITUS.**

COMPOUND MENTHOL POWDER.

*Synonym.*—<sup>Compound</sup>Menthol Snuff.

Menthol, in powder	...	...	...	...	5'00
Ammonium Chloride, in powder	...	...	...	...	10'00
Boric Acid, in powder	...	...	...	...	20'00
Lycopodium	...	...	...	...	65'00

Mix the powders.

This powder is used as a snuff in nasal catarrh and hay fever.

**PULVIS MORPHINÆ COMPOSITUS.**

COMPOUND MORPHINE POWDER.

Morphine Sulphate	...	...	...	...	1'50
Camphor, in fine powder	...	...	...	...	32'00
Liquorice Root, in No. 80 powder	...	...	...	...	33'00
Precipitated Calcium Carbonate	...	...	...	...	33'50

Mix the morphine sulphate intimately with the calcium carbonate, add the camphor and liquorice powder, pass the mixture through a No. 40 sieve, and transfer to well-stoppered bottles.

*Dose.*—1 to 5 decigrams (2 to 8 grains).*NOTE.*—This preparation corresponds to Pulvis Morphinæ Compositus, U.S.P.**PULVIS OPII COMPOSITUS.**

COMPOUND OPIUM POWDER.

*Synonym.*—Compound Powder of Opium.

Opium, in powder	...	...	...	...	10'50
Black Pepper, in powder	...	...	...	...	14'00
Ginger, in powder	...	...	...	...	35'00
Caraway Fruit, in powder	...	...	...	...	42'00
Tragacanth, in powder...	...	...	...	...	3'50

Mix the powders.

This preparation is employed usually in the form of Confectio Opii, for diarrhoea and colic.

*Dose.*—1 to 6 decigrams (2 to 10 grains).*NOTE.*—Compound powder of opium contains 10 per cent. of opium.**PULVIS PANCREATICUS COMPOSITUS**

COMPOUND PANCREATIC POWDER.

*Synonym.*—Peptonising Powder.

Pancreatin	...	...	...	...	20'00
Sodium Bicarbonate	...	...	...	...	80'00

Mix the pancreatin with the sodium bicarbonate by trituration.

This powder is used for peptonising milk,  $1\frac{1}{2}$  grammes being sufficient to peptonise 500 mls of fresh cow's milk, or 25 grains for 1 pint. The powder is added to 125 mls (or 5 fluid ounces) of tepid water in a flask, and the milk, previously heated to 38°, added. The temperature of the mixture is maintained at 38° for half an



hour, after which the flask should be transferred to a cool place until required for use. The peptonised milk should not be used when it has been kept for more than twenty-four hours, or after it has acquired a bitter taste.

NOTES.—This preparation corresponds to *Pulvis Pancreaticus Compositus*, N.F. The addition of 3·5 per cent. of the powder to milk sugar produces a "milk powder" which can be used for preparing humanised milk by the following process:—Triturate  $6\frac{1}{2}$  of the milk powder with 62 of water, add the mixture to 62 of fresh cow's milk which has been enriched by the addition of 15 of fresh cream. Immerse the bottle containing the whole in water heated to 38°, for fifteen minutes, then heat the mixture quickly to boiling in a suitable vessel, and allow it to cool immediately to the body temperature. Humanised milk should be prepared immediately before use.

### PULVIS RHEI COMPOSITUS.

#### COMPOUND RHUBARB POWDER.

*Synonyms*.—Compound Powder of Rhubarb; Gregory's Powder.

Rhubarb Root, in powder	...	...	...	22·00
Light Magnesia...	...	...	...	66·00
Ginger, in powder	...	...	...	11·00

Mix the powders.

This powder is a valuable antacid and laxative for children and delicate persons. Heavy magnesia may be employed in preparing it if a less bulky powder be desired.

*Dose*.—1 to 4 grammes (20 to 60 grains).

NOTE.—*Pulvis Rhei Compositus*, U.S.P., is prepared by mixing 25 of rhubarb, in No. 60 powder, with 65 of magnesium oxide, and 10 of ginger, in No. 60 powder.

### PULVIS RHEI CUM HYDRARGYRO.

#### RHUBARB POWDER WITH MERCURY.

Rhubarb Root, in powder	...	...	...	66·00
Mercurous Chloride	...	...	...	16·50
Ginger, in powder, sufficient to produce	...	...	...	100·00

Mix the powders.

*Dose*.—2 decigrams (3 grains) for a child twelve months old.

### PULVIS RHEI CUM HYDRARGYRO ET SODA.

#### RHUBARB POWDER WITH MERCURY AND SODA.

*Synonym*.—Baird's Aperient Powder.

Rhubarb Root, in powder	...	...	...	50·00
Mercury, with Chalk	...	...	...	16·50
Sodium Bicarbonate, sufficient to produce	...	...	...	100·00

Mix the powders.

*Dose*.—4 to 8 decigrams (6 to 12 grains),

**PULVIS RHEI CUM MAGNESIA.**

RHUBARB POWDER WITH MAGNESIA.

*Synonym.*—Improved Gregory's Powder.

Rhubarb Root, in powder	...	...	...	22'00
Magnesium Carbonate	...	...	...	66'00
Ginger, in powder	...	...	...	11'00

Mix.

*Dose.*—1 to 4 grammes (20 to 60 grains).

*NOTE.*—Heavy magnesium carbonate may be employed if a less bulky powder be desired.

**PULVIS RHEI CUM SODA.**

RHUBARB POWDER WITH SODA.

Rhubarb Root, in powder	...	...	...	33'00
Sodium Bicarbonate, sufficient to produce	...	...	...	100'00

Mix the powders.

This powder may be supplied as a lightly compressed tablet, to be crushed to powder before administration.

*Dose.*—2 decigrams (3 grains) for a child twelve months old.**PULVIS ROSÆ COMPOSITUS.**

COMPOUND ROSE POWDER.

Oil of Rose	...	...	...	...	0'10
Gum Acacia, in powder	...	...	...	...	15'00
Solution of Carmine	...	...	...	...	1'25
Refined Sugar, in powder, sufficient to produce	...	...	...	...	100'00

Mix the powders and oil, and colour with the solution of carmine.

This is used as a diluent for powders such as calomel and grey powder.

**PULVIS SALIS CAROLINI FACTITII.**

ARTIFICIAL CARLSBAD SALT.

Exsiccated Sodium Sulphate, in powder	...	...	...	44'00
Potassium Sulphate, in powder	...	...	...	2'00
Sodium Chloride, in powder	...	...	...	18'00
Sodium Bicarbonate, in powder	...	...	...	36'00

Mix the ingredients, previously well dried, so as to produce a fine uniform powder. The dried sodium sulphate is prepared by slowly drying the crystalline salt until its weight is reduced by half.

An aqueous solution (0.5 per cent.) of this preparation resembles Carlsbad water.

*Dose.*—2 to 4 grammes (30 to 60 grains).

**PULVIS SALIS CAROLINI FACTITII EFFERVESCENS.**

EFFERVESCENT ARTIFICIAL CARLSBAD SALT.

*Synonym.*—Effervescent Carlsbad Powder.

Exsiccated Sodium Sulphate ... ..	9'00
Sodium Potassium Tartrate, in powder ...	38'00
Sodium Chloride, in powder ... ..	3'00
Sodium Bicarbonate, in powder ... ..	33'00
Gluside ... ..	0'05
Tartaric Acid, in powder sufficient to produce	100'00

Dry the ingredients separately, reduce them to fine powder, and mix intimately.

*Dose.*—4 to 8 grammes (60 to 120 grains).

**PULVIS SCAMMONII COMPOSITUS.**

COMPOUND SCAMMONY POWDER.

*Synonym.*—Compound Powder of Scammony.

Scammony Resin, in powder ... ..	50'00
Jalap in powder... ..	37'50
Ginger, in powder ... ..	12'50

Mix the powders. This mixture is used instead of compound jalap powder if a more powerful action is required.

*Dose.*—6 to 12 decigrams (10 to 20 grains).

**PULVIS SCAMMONII CUM HYDRARGYRO.**

SCAMMONY POWDER WITH MERCURY.

Mercurous Chloride ... ..	20'00
Scammony Resin, in powder ... ..	80'00

Mix the powders.

*Dose.*—3 decigrams (5 grains) for an adult.

**PULVIS SODÆ TARTARATÆ EFFERVESCENS.**

EFFERVESCENT TARTARATED SODA POWDER.

*Synonyms.*—Pulvis Effervescens Compositus; Compound Effervescing Powder; Seidlitz Powder.

Sodium Potassium Tartrate, in dry powder ...	75'00
Sodium Bicarbonate, in dry powder ... ..	25'00

Mix, divide into powders weighing 10'36 grammes (160 grains) and wrap the powders in blue paper. When required for use dissolve one of the powders in about 300 mls (10 fluid ounces) of cold or warm water, add 2'46 grammes (38 grains) of tartaric acid in dry powder, and drink while effervescence continues. The tartaric acid should be kept ready for use in powders wrapped in white paper.

When "Extra Strong Seidlitz Powders" are required, the quantity of sodium potassium tartrate in each blue paper should be increased by one-half, while "Double Strength Seidlitz Powders" should contain twice the usual quantity of sodium potassium tartrate. In so-called "Improved Seidlitz Powders" the tartaric acid in each



white paper is replaced by 22 decigrams (35 grains) of citric acid in powder, flavoured with 3 centimils ( $\frac{1}{2}$  minim) of oil of lemon.

NOTE.—*Pulvis Effervescens Compositus*, U.S.P., is prepared by mixing 31 grammes of sodium bicarbonate with 93 grammes of sodium potassium tartrate, and dividing the mixture into twelve equal parts, the corresponding acid powders being prepared by dividing 27 grammes of tartaric acid into twelve parts.

### PULVIS STRAMONII COMPOSITUS.

#### COMPOUND STRAMONIUM POWDER.

*Synonym.*—Sir James Sawyer's Asthma Powder.

Stramonium Leaves, in powder	...	...	50'00
Lobelia, in powder	...	...	6'00
Anise Fruit, in powder...	...	...	12'00
Tea Leaves, in powder	...	...	6'00
Oil of Eucalyptus	...	...	1'00
Potassium Nitrate, sufficient to produce	...	...	100'00

Mix the oil with the vegetable powders, then add the potassium nitrate.

This powder is used to relieve asthma. About half a teaspoonful is pressed by the fingers into the shape of a cone, which is then lighted at the top; the patient inhales the fumes as the powder burns. The powder is used several times daily, as may be necessary, for asthma. *Pulvis Lobeliæ Compositus* is a similar preparation.

NOTE.—A simpler form of Sir James Sawyer's Asthma Powder consists of 50 of stramonium leaves in powder, mixed with 25 each of potassium nitrate and anise fruit in powder; it may be distinguished as *Pulvis Stramonii Nitratus*.

### PULVIS THEOBROMATIS.

#### THEOBROMA POWDER.

*Synonym.*—Cocoa.

Theobroma powder or cocoa is prepared from the seeds of *Theobroma Cacao*, Linn. (N.O. Sterculiaceæ), by depriving the kernels of fat and grinding the pressed kernels to powder, the product being afterwards treated so as to render it readily diffusible in water.

As found in commerce, cocoa is a brown powder, which should contain but little fat, starch, or sugar. It is sometimes flavoured, and should diffuse readily when mixed with boiling water.

Cocoa is used in the preparation of various compressed tablets.

### PULVIS TRAGACANTHÆ COMPOSITUS.

#### COMPOUND TRAGACANTH POWDER.

*Synonym.*—Compound Powder of Tragacanth.

Tragacanth, in powder	...	...	16'50
Gum Acacia, in powder	...	...	16'50
Starch, in powder	...	...	16'50
Refined Sugar, in powder	...	...	49'50

Mix the powders intimately.

This mixture is used mainly as a suspending and emulsifying agent.

*Dose.*—1 to 4 grammes (20 to 60 grains).

### PULVIS VIOLÆ.

VIOLET POWDER.

Orris Rhizome, in fine powder	...	...	12.50
Oil of Bergamot	...	...	0.25
Oil of Neroli	...	...	0.02
Starch, in powder, sufficient to produce	...	...	100.00

Triturate the oils with the powdered orris, then add the starch, mix thoroughly, and pass through a fine sieve.

Violet powder is used for nursery and toilet purposes, when a soluble powder is not required.

*NOTE.*—Soluble toilet powders consist usually of finely powdered and sifted boric acid, suitably coloured and perfumed.

### PULVIS SUPRARENALIS COMPOSITUS.

COMPOUND SUPRARENAL POWDER.

*Synonym.*—Suprarenal Snuff.

Dry Suprarenal...	...	...	5.00
Boric Acid, in powder	...	...	30.00
Camphor, in fine powder	...	...	1.50
Menthol, in powder	...	...	3.00
Oil of Eucalyptus	...	...	1.00
Lycopodium, sufficient to produce	...	...	100.00

Mix the oil of eucalyptus with the powders.

This preparation is used as an insufflation for vascular engorgement of the nasal mucous membrane, spasmodic asthma, etc., a pinch of the powder being applied like snuff to each nostril every two or three hours.

### PULVIS ZINCI OLEATIS COMPOSITUS.

COMPOUND ZINC OLEATE POWDER. •

Zinc Oleate, in fine powder	...	...	25.00
Boric Acid, in fine powder	...	...	25.00
Oil of Rose	...	...	0.10
Starch, in powder, sufficient to produce	...	...	100.00

Mix the oil intimately with the powders.

This preparation is used as a dusting powder.

### PULVIS ZINCI OXIDI ET ACIDI BORICI.

ZINC OXIDE AND BORIC ACID POWDER.

Zinc Oxide	...	...	50.00
Boric Acid, in powder	...	...	50.00

Mix the powders intimately.

This preparation is used as a dusting powder.

**PULVIS ZINCI OXIDI ET ACIDI SALICYLICI.**

ZINC OXIDE AND SALICYLIC ACID POWDER.

Zinc Oxide	...	...	...	...	20'00
Salicylic Acid, in fine powder	...	...	...	...	5'00
Starch, in powder	...	...	...	...	75'00

Mix the powders intimately.

This preparation is used as a dusting powder.

**PULVIS ZINCI OXIDI ET AMYLI.**

ZINC OXIDE AND STARCH POWDER.

Zinc Oxide	...	...	...	...	50'00
Starch, in powder	...	...	...	...	50'00

Mix the powders intimately.

This preparation is used as a dusting powder.

**PYRETHRI FLORES.**

PYRETHRUM FLOWERS.

*Synonym.*—Insect Flowers.

Pyrethrum flowers consist of the dried unexpanded flower-heads of *Chrysanthemum cinerariæfolium*, Vis. (*Pyrethrum cinerariæfolium*, Trev.), and of *C. coccineum*, Willd., also known as *C. roseum*, Web. et Mohr (N.O. Compositæ). The first-named species yields the Dalmatian, the latter the Persian or Caucasian drug. The Dalmatian plant, which furnishes the bulk of the insect flowers of commerce, is indigenous to and cultivated in Dalmatia and Montenegro, the wild Montenegrin flowers being the most esteemed. The flower-heads are cut off just below the involucre, before they expand, and dried, the flower-heads being much less active when fully expanded. Persian insect flowers are seldom imported. They are distinguished by the dark involucre bracts, and by the ten-ribbed fruits. They are said to be inferior to the Dalmatian insect flowers.

Three varieties of Dalmatian insect flowers are known in commerce, viz., closed, half closed, and open, the first-named being the most valuable. These are yellowish-brown in colour, and broadly conical or nearly globular in shape, being crowned with the yellowish, shrivelled, ligulate corollas of the ray florets. On the outside are two or three rows of yellowish lanceolate bracts; these are succeeded by a single row of ray florets, the centre being occupied by a large number of disc florets. The latter have a short, yellow corolla, the calyx is membranous, and crowns a five-ribbed fruit, on which shining glands can be seen with a lens. Half-closed flowers are nearly hemispherical in shape, the ligulate corollas spreading rather more, while open flowers are almost basin-shaped, and many of the ligulate corollas have been broken off and lie loose in the package.



Closed Dalmatian flowers yield about 1·5 per cent. of volatile oil, but the insecticidal properties are due to an acid substance named pyrethrotoxic acid, which is stable and not volatile, hence insect powder does not lose its activity on exposure to the air. Substances of alkaloidal and of glucosidal nature have also been found, but little definite is known concerning them. Good Dalmatian flowers yield about 8 or 9 per cent. of ash, and contain about 10 per cent. of moisture. They should yield to ether from 7·5 to 10·5 per cent. of a yellow extract. Half-closed flowers yield from 6 to 7 per cent., and open from 5 to 6 per cent. If much stem is present the extract will be greenish in colour. Lead chromate, which is occasionally used to heighten the colour, may be detected in the ash. The powder is liable to adulteration with that of other composite flowers. Its quality may be judged by the details given above, and also by the rapidity with which it stupefies small insects. A tincture of pyrethrum flowers is prepared, and is used, diluted with 10 parts of water, to dab on exposed skin to keep away insects.

### PYRETHRI RADIX.

#### PYRETHRUM ROOT.

*Synonyms.*—Pyrethrum; Pellitory Root.

Pyrethrum root is obtained from *Anacyclus Pyrethrum*, DC. (N.O. Compositæ), a small plant indigenous to Algeria, being collected in the autumn and dried.

The root is simple, from 5 to 10 centimetres long, and about 12 millimetres in thickness, tapering towards the tip, and often also towards the crown, where a tuft of greyish hairs can usually be seen. The external surface is brown and longitudinally furrowed. The root is tough, but breaks with a short fracture, the fractured surface exhibiting a conspicuously radiate structure, narrow yellowish wedges of wood alternating with whitish medullary rays. Numerous yellow or brown oil glands occur both in the cortex and medullary rays. The odour is characteristic, the taste pungent, producing a copious flow of saliva.

The chief constituents are a crystalline alkaloid, pyrethrine (also called pellitorine), which possesses an intensely pungent taste, and produces the sialagogue effect. It also contains an acrid resin and two acrid fixed oils, together with tannin, inulin, etc. It yields from 4 to 6 per cent. of ash.

Pyrethrum root is used as a masticatory, and in the form of lozenge for its reflex action on the salivary glands in dryness of the mouth and throat. It is applied on cotton wool, or rubbed along the gums in toothache, and for this purpose may with advantage be mixed with camphorated chloroform.

*Dose.*—1 to 2 grammes (15 to 30 grains).

*Notes.*—The root of *Corrigiola telephifolia*, Pour. (N.O. Illecebraceæ), is not infrequently found in commercial pellitory root, occasionally in considerable quantity. The root resembles pellitory very closely, but may be distinguished

by the warty protuberances with which it is crowned, and by the section which exhibits three or four concentric circles, that of pellitory being radiate. It is devoid of the pungent taste of pellitory.

## PYRIDINA.

### PYRIDINE.



Pyridine,  $\text{C}_5\text{H}_5\text{N}$ , is a base which occurs with its homologues in the products resulting from the dry distillation of nitrogenous organic matter (Dippel's oil), also in tobacco smoke, coal tar, naphtha, etc. From bone oil it is prepared by treating with sulphuric acid, separation of the sulphuric compounds, and decomposition with sodium hydroxide. The mixture of bases set free (pyridine, aniline, etc.) is carefully fractionated, the distillate treated with acid oxidising agents which attack only the aniline bases, neutralised with sodium hydroxide, and fractionated again. The pyridine may be purified by precipitating the crude bases dissolved in 10 per cent. solution of hydrochloric acid with mercuric chloride dissolved in hot water. The crystalline double salt thus formed is distilled with sodium hydroxide. The base may be prepared synthetically by the action of phosphorus pentoxide on amyl nitrite, and also by heating piperidine with sulphuric acid at  $300^\circ$ . It is of special interest because of having been recognised as one of the parent substances of many alkaloids.

It occurs as a colourless, limpid, volatile liquid, having a powerful, persistent, empyreumatic odour, and causing a bitter taste in the mouth and back of the throat; it is hygroscopic and difficult to obtain absolutely dry. Soluble in all proportions of water, alcohol, ether, chloroform, benzene, fatty oils, etc. The aqueous solution has a strong alkaline reaction, and is precipitated by the fixed alkaline hydroxides; it does not affect phenol-phthalein. Specific gravity, 0.980. Boiling-point,  $117^\circ$ . With water it unites to form a hydrate,  $\text{C}_5\text{H}_5\text{N}, 3\text{H}_2\text{O}$ , which boils at  $93^\circ$ . Heated with hydriodic acid to  $300^\circ$  it yields normal pentane,  $\text{C}_5\text{H}_{12}$ . It combines with acids to form addition salts which are crystalline, hygroscopic, and readily soluble in water. As in the case of ammonia, it gives rise to white fumes in contact with hydrochloric acid vapour. With copper chloride it gives a precipitate soluble in excess of the base; the solution is blue, and leaves on evaporation crystals of a double salt of the same colour. It precipitates solutions of ferric, chromium, and aluminium salts as hydroxides, and has the peculiar property of forming crystalline double salts of the metals, especially the chlorides of zinc, cadmium, copper, and mercury. A half per cent. solution should give with an equal volume of saturated solution of picric acid a crystalline precipitate becoming almost solid. Nascent hydrogen converts it into piperidine. It is not attacked by boiling nitric acid or chromic acid, being highly resistant to oxidation. It should remain unaltered on exposure to the air (absence of furfural), and should not be affected

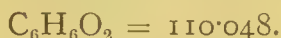
by phenol-phthalein (absence of ammonia). If 5 mls of a 60 per cent. aqueous solution be mixed with 1 decimil of a 1 in 1000 solution of potassium permanganate, the red colouration should not disappear within an hour (absence of readily oxidisable impurities). One mil dissolved in 20 mls of water should require for neutralisation 12·4 mls of normal hydrochloric acid solution, using tincture of cochineal as indicator.

Pyridine and similar compounds are amongst the products of the dry distillation or slow combustion of most leaves, and to this substance is ascribed in part the beneficial action of the various burning-powders and cigarettes used in asthma (see *Pulvis Stramonii Compositus*). Pure pyridine is employed for a similar purpose; 2 to 4 mls (30 to 60 minims) is placed on a flat dish in a small room, and the vapour inhaled for fifteen to twenty minutes. It is also employed, diluted with 20 to 40 parts of liquid paraffin, in a nebulising apparatus. It apparently acts as a depressant to the nerve-endings in the bronchioles. It is much less toxic than either collidine or nicotine, which are given off along with pyridine from burning tobacco. Pyridine has been given internally in angina pectoris and cardiac dyspnœa, but without much benefit.

*Dose*.—3 to 6 decimils (5 to 10 minims).

## PYROCATECHINUM.

PYROCATECHIN.



*Synonyms*.—Catechol; Orthodioxylbenzene.

Pyrocatechin,  $\text{C}_6\text{H}_4(\text{OH})_2$ , the ortho variety of the three isomeric dihydroxybenzenes, occurs naturally in the leaves of the Virginian creeper, *Ampelopsis hederacea* (N.O. Vitaceæ), and is found among the products of the distillation of catechu, kino, and most vegetable extracts containing tannins. It is present in crude pyroligneous acid distilled from wood. Pix Liquida on keeping acquires a granular appearance, partly owing to the formation of minute crystals of pyrocatechin. It may be prepared chemically by fusing potassium phenol-sulphonate with potassium hydroxide, also by heating guaiacol to 195° to 200°, and then passing in hydriodic acid as long as methyl iodide distils over.

It occurs in the form of white, glistening, short, rectangular prisms, or acicular crystals, having a slight odour and a bitter taste. Soluble in water, alcohol, ether, and hot toluol; moderately soluble in benzene and chloroform. Melting-point, 104°; boiling-point, 240° to 245°, but it begins to sublime below this temperature in thin laminæ. It burns with a bright flame. The aqueous solution reduces silver salts in the cold, and Fehling's solution on warming; the alkaline aqueous solution rapidly absorbs oxygen, changing to green in colour, and finally to black. With ferric chloride it yields a green colour, changing to violet on addition of ammonia or sodium bicarbonate. With lead acetate a white precipitate is formed. It



precipitates a concentrated solution of egg albumen, but not gelatin. With nitric acid it reacts violently, forming oxalic acid. It has weak acid properties. The methyl ether of pyrocatechin is guaiacol. It should be protected from light and ammonia vapour.

Pyrocatechin is not employed in medicine.

## PYROXYLINUM.

### PYROXYLIN.

*Synonyms.*—Cellulose Tetranitrate ; Dinitro-cellulose.

Pyroxylin is prepared by immersing 10 of cotton in a mixture of 50 of sulphuric acid and 50 of nitric acid, stirring it constantly for three minutes, then removing the product, washing with water until free from acid, draining on filter paper, and drying on a water-bath.

The product is a white fibrous substance, resembling cotton in appearance. It should dissolve readily in twenty-five volumes of a mixture of ether and alcohol in equal proportions, and should leave no residue on ignition. It is also soluble in methylic alcohol, glacial acetic acid, amyl acetate, and acetone. When ignited it burns with great rapidity; it should be carefully stored in a dry place, or immersed in methylated spirit.

When pyroxylin is made by immersing the cotton in the mixture of acids at a high temperature the product yields with ether-alcohol a collodion known as "high-temperature collodion," which, on evaporation, leaves a film of a friable or rotten character, and unsuitable for many purposes. Made at a low temperature, however, the resulting pyroxylin yields a collodion whose film is tough and well adapted in every way for surgical use. The solubility of both varieties is the same. Pyroxylin consists of cellulose tetranitrate,  $C_{12}H_{16}(ONO_2)_4O_6$ , or dinitro-cellulose,  $C_6H_8(NO_2)_2O_5$ , and is distinguished from guncotton by its solubility in a mixture of equal volumes of ether and alcohol.

Pyroxylin is employed in the preparation of collodion and similar rapid-drying protective varnishes. Celloidin consists of pyroxylin which has been purified by solution in alcohol and ether.

*NOTES.*—Guncotton is cellulose hexanitrate,  $C_{12}H_{14}(ONO_2)_6O_4$ , or trinitro-cellulose,  $C_6H_7(NO_3)_3O_5$ . It is insoluble in a mixture of alcohol and ether. Filmogen, photoxylin, and other similar preparations are prepared by dissolving celloidin in acetone or other suitable solvent.

## QUASSIÆ LIGNUM.

### QUASSIA WOOD.

*Synonyms.*—Quassia; Jamaica Quassia.

Quassia wood is obtained from the trunk and branches of *Picræa excelsa*, Lindl. (N.O. Simarubææ), also known as *Picrasma excelsa*, Swartz (Planchon), a tree indigenous to Jamaica.

The wood is imported in logs and billets, often covered with a thin bark. For medicinal use the bark is removed, the wood is cut

into chips, and those are kiln dried. The logs as imported are of various lengths, and often 20 to 30 centimetres in diameter. The wood is yellowish-white, light, dense, and easily split. The transverse section exhibits numerous medullary rays, two to three cells wide; the vessels are usually in groups of two or three, and often extend from one medullary ray to the next; the fibres are moderately thick-walled, and the cells of the wood parenchyma often contain crystals of calcium oxalate. The drug is odourless, but has a very bitter taste.

The chief constituent of Jamaica quassia is picrasmin, a mixture of two homologous crystalline, bitter principles,  $\alpha$ -picrasmin and  $\beta$ -picrasmin (see Quassinum). The wood also contains a small quantity of a yellow, crystalline substance, which exhibits a blue fluorescence in an acidulated alcoholic solution, and resin. It yields about 4 per cent. of ash.

Quassia is a pure bitter, without astringency. It is employed to increase the appetite, and hence to improve the condition of the gastric mucous membrane; it is best administered thirty minutes before a meal in mixture form. It is a matter of considerable doubt whether all the benefit derived from bitters might not be obtained by the use of a simple gargle, and without swallowing the drug. On account of its freedom from tannin it may be prescribed with the salts of iron, for which infusion of quassia is a useful vehicle. An infusion of quassia (1 in 20), or Liqueur Quassiæ Concentratus mixed with an equal quantity of water, is used as an injection for the thread worms of children. A similar solution painted on the skin keeps away small insects.

*Dose*.—1 to 5 decigrams (2 to 8 grains).

NOTE.—Surinam quassia (from *Quassia amara*, Linn.) occurs in much smaller billets than Jamaica quassia, and is used on the Continent in its place. The wood closely resembles Jamaica quassia, but may be distinguished by the medullary rays, which are usually only one cell wide; it is, moreover, devoid of calcium oxalate. Surinam quassia contains four crystalline bodies, which have been termed quassiins. They are similar to, but not identical with, the picrasmins of Jamaica quassia. Quassia, U.S.P., may be either Jamaica or Surinam quassia. "Bitter" or "tonic" cups are vessels turned from a block of quassia wood; they are filled with water, which is allowed to stand overnight before taking as a bitter draught.

## QUASSINUM.

### QUASSIN.

*Synonym*.—Picrasmin.

Quassin may be obtained by exhausting Jamaica quassia wood with 50 per cent. alcohol, neutralising with magnesia, making the solution acid with tartaric acid, and removing the alcohol by distillation. The residue is shaken with chloroform, the latter evaporated to a syrup and this dissolved in a mixture of equal volumes of absolute alcohol and ether; evaporated, and dissolved again in a little absolute alcohol. This concentrated alcoholic

solution is covered with a layer of ether and set aside to crystallise. The product may be recrystallised from alcohol. It is a mixture of two homologous crystalline bitter principles,  $\alpha$ -picrasmin,  $C_{35}H_{46}O_{10}$ , which melts at  $204^{\circ}$ , and  $\beta$ -picrasmin,  $C_{36}H_{48}O_{10}$ , which melts at  $209^{\circ}$  to  $212^{\circ}$ .

It occurs in the form of white, inodorous, crystalline needles or prisms, which have an extremely and persistently bitter taste, and are neutral in reaction, dextro-rotatory, and permanent in air. Sparingly soluble in water (about 1 in 1200), the solution possessing a bitter taste, easily soluble in alcohol, very soluble in chloroform (about 1 in 2), and in benzene, slightly soluble in ether or petroleum ether, soluble in caustic alkaline and acid liquids. It yields picrasmic acid on hydrolysis with hydrochloric acid. It is removed from acid solutions by chloroform or benzene. It is not precipitated by lead acetate, but the basic acetate gives a slight cloud. Tannic acid precipitates the alcoholic solution.

Quassin is seldom employed in medicine; it is not very suitable for use in aqueous solution, which is the best form in which to administer bitters. It has been given in pill form by trituration with milk sugar and massing with syrup of glucose.

*Dose*.—2 to 20 milligrams ( $\frac{1}{30}$  to  $\frac{1}{3}$  grain).

NOTES.—The bitter principle of Surinam quassia, *Quassia amara*, Linn. (N.O. Simarubæ), is closely allied to, but not identical with, the quassin of *Picræna excelsa*; like the latter, it is a mixture of homologous, crystalline, bitter principles, of the formulæ  $C_{35}H_{46}O_{10}$  and  $C_{37}H_{50}O_{10}$ , and it yields quassic acid on hydrolysis with hydrochloric acid. A purified extract in the form of an amorphous, granular, sticky powder, yellowish-brown in colour, is also known commercially as quassin.

## QUEBRACHO.

### QUEBRACHO.

*Synonyms*.—White Quebracho; *Aspidosperma*.

Quebracho is the dried bark of *Aspidosperma Quebracho-blanco*, Schlecht. (N.O. Apocynaceæ), a large evergreen tree which abounds in the dry central and western districts of the Argentine and adjacent regions.

It occurs in nearly flat pieces, from 1 to 3 centimetres thick, without odour, but with a very bitter and slightly aromatic taste. The outer surface is yellowish-grey or brownish, and deeply fissured; the inner surface is yellowish-brown or reddish-brown, and distinctly striate. When broken, the fractured surface displays two sharply-defined strata of about equal thickness, both of which are marked with numerous whitish dots and striæ arranged in tangential lines. The fracture of the outer, lighter-coloured layer is rather coarsely granular, while that of the darker coloured, inner layer is short-splintery.

The bark contains from 3 to 5 per cent. of tannin, two sugars—quebrachite and inosite, together with starch, and the following



alkaloids : — Aspidospermine, aspidospermatine, aspidosamine, quebrachine, hypoquebrachine, and quebrachamine. Commercial aspidospermine is usually a mixture of these alkaloids.

Quebracho is a bitter, and has been given as a “tonic” and febrifuge, but it is now rarely used. It is usually administered in the form of tincture; a liquid extract (1 in 1) has also been prepared.

## QUERCUS CORTEX.

### OAK BARK.

Oak bark is obtained from the smaller branches and young stems of the British oak, *Quercus robur*, Linn. (N.O. Cupuliferæ), and is collected in spring from trees growing in Britain. The oak, and particularly the two forms formerly distinguished as *Q. pedunculata*, Ehr., and *Q. sessiliflora*, Martyn, is largely cultivated for its bark, which is almost universally employed as a tanning material. For this purpose the young plants or shoots arising from the stools of felled trees are allowed to grow until they are about fifteen to twenty years old, when they are about 10 to 15 centimetres thick, and still retain their smooth bark. The latter is stripped in May, and dried, first on hurdles and afterwards in a warm room.

It occurs in pieces about 25 millimetres wide, 2 millimetres thick, and of varying length. The cork is glossy and silvery grey, often marked with darker, transverse lenticels. The inner surface is brown and coarsely striated. The bark breaks with a fibrous fracture, the section exhibiting under the lens a thin cork, and a narrow cortex separated by a line of sclerenchymatous cells from the bast, in which radially and tangentially arranged groups of bast fibres can be distinguished. It is odourless, but has a sweetish taste, with an astringent after-taste. Bark of about the age and appearance indicated is richer in quercitannic acid than either older or younger bark. Older bark may be distinguished by the formation of outer bark, the smooth silvery cork becoming fissured, dark, and dull. Younger bark may be recognised by its smaller size.

The chief constituent of oak bark is quercitannic acid ( $C_{17}H_{16}O_9$ ), of which it should contain from 15 to 20 per cent. Bark of lower grade contains about 12 per cent., whilst trunk bark contains from 5 to 8 per cent., or if the outer bark has been removed 8 to 10 per cent. It also contains a phlobaphene, oak red, which is produced from quercitannic acid by hydrolysis, and may be regarded as its anhydride; gallic acid, ellagic acid, quercite, lævulin, phloroglucin, starch, etc., are also present. It yields about 6 per cent. of ash.

Oak bark is an astringent employed for external use as Decoctum *Quercus*, in gonorrhœa and leucorrhœa, as a rectal injection in hæmorrhoids, and as a gargle in sore throats.

*Dose.*— $\frac{1}{2}$  to 2 grammes (8 to 30 grains).

*NOTES.*—*Quercus*, U.S.P., consists of the dried bark of *Quercus alba*, Linn., collected from trunks or branches from ten to twenty-five years old, and deprived of the periderm. The average dose of white oak is 1 gramme (15 grains).

## QUILLAIAE CORTEX.

## QUILLAIA BARK.

*Synonyms*.—Quillaja; Panama Bark; Soap Bark.

Quillaia bark is obtained from *Quillaja saponaria*, Molina (N.O. Rosaceæ), a large tree indigenous to Chili and Peru. The bark is stripped from the tree in large pieces, freed from the outer portion, and dried.

The bark occurs in large, flat sheets, about 4 millimetres thick. The outer surface is longitudinally striated, and is of a pale brownish or yellowish-white colour, but reddish-brown where the outer portion has been imperfectly removed; the inner surface is smooth and white. The fracture is splintery, the fractured surface being laminated, and exhibiting small crystals of calcium oxalate when examined with a lens. The transverse section shows tangentially arranged bands of bast parenchyma, and groups of bast fibres traversed by radial medullary rays. The bark has no odour, but the taste is astringent and acrid. The powder acts as a powerful sternutatory.

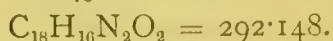
The chief constituents of the bark are two amorphous toxic glucosides, quillajic acid and sapotoxin. These principles belong to the class of saponins (see Saponinum); they both impart to water the property of frothing, but the acrid taste and sternutatory effect are due to sapotoxin alone. Other constituents of the bark are starch and gum. The ash is about 12 (8 to 14.0) per cent.

Quillaia has been recommended as an expectorant, and acts on the bronchiolar cells reflexly by irritating the stomach. As it contains so much more sapotoxin than senega it is a more powerful expectorant. Like most other expectorants in large doses it is emetic. Tincture of quillaia is used as an emulsifying agent for fixed and volatile oils, oleoresins, etc., the amount of tincture required varying from one-fifteenth to one-half the amount of oil to be emulsified according to its nature.

NOTE.—A bark very closely resembling the one described, but thinner and less acrid, has been largely imported; it appears to be derived from a different species of *Quillaja*.

## QUINALGEN.

## QUINALGEN.



*Synonyms*.—Benzanalgene; Chinalgen; Benzoyl-amido-ethoxy-quinoline; Ortho-ethoxy-ana-benzoyl-amido-quinoline.

Quinalgen,  $\text{C}_9\text{H}_5(\text{OC}_2\text{H}_5)\text{NH}(\text{COC}_6\text{H}_5)\text{N}$ , is prepared by reducing ethoxy-nitro-quinoline with nascent hydrogen, and treating the product with benzoyl chloride.

It occurs as a white crystalline powder, neutral, odourless, and perfectly tasteless. Very slightly soluble in water, difficultly

soluble in cold alcohol, more readily soluble in hot alcohol, fairly soluble in chloroform, almost insoluble in ether, soluble in dilute acids. Melting-point,  $208^{\circ}$ . Incinerated it leaves no residue. A saturated solution yields a yellowish colouration in the cold with ferric chloride, becoming brown-red on heating. It dissolves in nitric acid (25 per cent.), forming a yellow solution, which on evaporation on the water-bath leaves an orange-red residue. With concentrated sulphuric acid it forms a light yellow-coloured solution, from which a lemon-yellow precipitate is thrown down on dilution with water; if 1 decimil of the solution be shaken with 6 to 8 mils of water, it assumes a yellow colouration on the addition of hydrochloric acid or diluted sulphuric acid, and dissolves on heating. On cooling the solution the yellow-coloured compound crystallises out. A saturated solution does not reduce silver nitrate either in the cold or on warming.

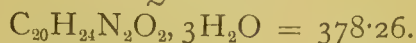
Quinalgen resembles phenacetin in its properties, but is more toxic, sometimes giving rise to convulsions and cyanosis. It has been employed with success in neuralgia and sciatica, and is best administered in cachets. It is apt to colour the urine red.

*Dose.*— $\frac{1}{2}$  to 1 gramme (8 to 15 grains).

NOTES.—Quinalgen is also known under the trade-names Analgen and Labordin; the name Analgen was formerly applied to the acetyl derivative of amido-ethoxy-quinoline, but the benzoyl compound was found to be a preferable product, free from the disagreeable taste of the acetyl compound.

## QUININA.

### QUININE.



Quinine,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2, 3\text{H}_2\text{O}$ , is the chief alkaloid of *Cinchona Calisaya*, Weddell, and other trees of the N.O. Rubiaceæ, more especially *C. Ledgeriana*, Moens, and *C. lancifolia*, Mutis. It may be obtained from the powdered bark, in which it doubtless pre-exists in combination with quinic or cinchotannic acid, by mixing the powder with lime, and extracting with alcohol or petroleum spirit, or by repeatedly boiling the bark with diluted sulphuric or hydrochloric acid, and precipitating the solution with calcium or sodium hydroxide. The precipitate thus obtained is dissolved in 75 or 80 per cent. alcohol, neutralised with diluted sulphuric acid, and the alcohol distilled off. The resulting quinine sulphate on crystallising is separated from the mother-liquor, and repeatedly crystallised from water, whereby the salt is completely freed from the sulphates of the other alkaloids. The solution of the quinine sulphate in diluted sulphuric acid is precipitated by ammonia, the curdy precipitate of the alkaloid first formed being amorphous and anhydrous, but subsequently changing in presence of ammonia and water into a minutely crystalline state with three molecules of water. It is washed and dried at a low temperature. Quinine is considered to be a derivative of hydro-diquinoline.



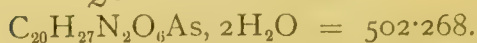
It occurs as a white, soft, flaky, or granular powder, or as a micro-crystalline powder consisting of minute four-sided prisms terminated by pyramids, sometimes slightly damp from adhering moisture, odourless, and having a bitter taste, slightly efflorescent in dry air. Slightly soluble in water, soluble in alcohol (1 in 1), in ether (1 in 4), in chloroform (1 in 3), in carbon bisulphide, benzene, volatile and fixed oils, diluted acids, aqueous ammonia, and to some extent in glycerin. Its aqueous solution is lævo-rotatory and alkaline to litmus, but not to phenol-phthalein. Its solution in diluted sulphuric acid has a strong blue fluorescence, perceptible 1 in 200000, which is destroyed by the halogen acids, hyposulphites, and some other bodies. Quinine is a strong base with an alkaline reaction in aqueous and alcoholic solutions, neutralising the strongest acids, forming neutral and acid salts, which for the most part crystallise well, their solutions tasting intensely bitter. It is dibasic, and liberates ammonia from solutions of its salts on heating. At ordinary temperatures it gradually loses its water of crystallisation—the  $3\text{H}_2\text{O}$  corresponding to 14 per cent.; it also becomes anhydrous on standing over sulphuric acid. On heating it fuses at  $57^\circ$ , loses two molecules of water of crystallisation at  $100^\circ$ , and becomes anhydrous at  $125^\circ$ , in which condition it melts at about  $174^\circ$ . On ignition it leaves no residue. Quinine reacts with the usual alkaloidal reagents. It should dissolve in concentrated sulphuric acid without imparting more than a faint yellowish tint (absence of readily carbonisable impurities); treatment with nitric acid should not produce a red colour (distinction from morphine). In a slightly warmed mixture of 6 mils of absolute alcohol and 3 mils of ether, 1 gramme of the alkaloid should dissolve completely and should remain clear on cooling (absence of cinchonine and cinchonidine). To 1 mil of a 1 per cent. aqueous solution, containing sufficient sulphuric acid to dissolve the base, the addition of 2 or 3 mils of solution of bromine, followed by 1 mil of solution of ammonia, produces an emerald-green colour (thalleioquin reaction). If 7 decigrams be dissolved in a mixture of 15 mils of acetic acid, 6 mils of alcohol, and 5 decimils of sulphuric acid, the solution heated to boiling, and 7 mils of a saturated solution of iodine in alcohol be added slowly, bronze or olive-green crystals of quinine iodo-sulphate will separate on gradually cooling the solution (Herapath reaction); the crystals formed are insoluble in cold water. Quinine should be free from ammonia, and on heating to  $125^\circ$  should not lose more than 14.3 per cent. of its weight (absence of excess of water). On heating with glycerin to about  $180^\circ$  it is converted into the isomeric base quinicine, which is amorphous and dextro-rotatory. It is oxidised by potassium permanganate to pyridine dicarboxylic acid, and by reduction with zinc and sulphuric acid, hydroquinine,  $\text{C}_{20}\text{H}_{26}\text{N}_2\text{O}_2$ , is formed. Fused with potassium hydroxide, methoxyquinoline,  $\text{C}_9\text{H}_6\text{N}(\text{OCH}_3)$ , is produced.

Quinine is a general protoplasmic poison and in sufficient concentration paralyses all forms of living matter. It is especially fatal to undifferentiated protoplasm; fresh-water amœbæ are rendered

motionless by a solution of 1 in 50000 quinine, and stronger solutions rapidly disintegrate these unicellular organisms. The movements of cilia and spermatozoa are likewise brought to a standstill, and the latter finally destroyed. Quinine therefore exerts an antiseptic action; it prevents acetic and butyric fermentation and inhibits the growth of yeast and putrefying organisms. It also retards the action of many unorganised ferments, especially pepsin and trypsin, and to some extent pytalín and diastase. It inhibits the action of oxydases, and to this property is attributed the remarkable power of quinine to diminish metabolism. The absorption of food is not affected, but the solids of the urine and especially its nitrogenous constituents are greatly reduced. Though proteid metabolism is thus diminished, the absorption of oxygen and the elimination of carbonic acid are unaffected; there is therefore assumed to be a conservation in the body of nitrogenous material which in the ordinary course would have been oxidised, appearing in the solids of the urine. Quinine, after absorption, exercises upon the white corpuscles of the blood an effect exactly similar to that exerted upon fresh-water amœbæ; it tends to arrest their amœboid movements so that diapedesis becomes impossible. The use of the drug therefore tends to inhibit the formation of pus, but large doses are necessary to prevent suppuration. The action of quinine on leucocytes is only an example of its effects on the tissues generally.

Quinine is a specific in malaria, its action on the malarial parasite being another example of its general effect as a protoplasmic poison. On the warm stage of the microscope, the movements of the protozoon of malaria are arrested by a solution of 1 in 10000 quinine; the organism is, however, more susceptible to the action of quinine at some stages of its existence than at others, and the best results are obtained by the administration of the dose a few hours before the paroxysm, so that, allowing time for absorption, the quinine may be in greatest concentration in the blood at the time of the breaking up of the segmented organism into spores, which is coincident with the onset of fever. Quinine is sometimes used in fevers as an antipyretic; its action in reducing temperature is due to diminished heat production, not to augmented loss of heat. In acute fevers the lessened tissue destruction following the use of quinine is probably as important as the reduction of temperature. Many persons show a marked idiosyncrasy to quinine, and symptoms of "quinism" may result from comparatively small doses. These are giddiness, headache, humming noises in the ears with deafness that may last a few hours, disturbances of vision and sometimes erythematous or urticarial skin eruptions. Quinine is employed in headache and neuralgia, in hay fevers and influenzal catarrhs. The pure alkaloid is rarely employed on account of its insolubility; the most commonly used salts are the sulphate, hydrochloride, and hydrobromide.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

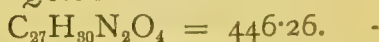
**QUININÆ ARSENAS.****QUININE ARSENATE.**

Quinine arsenate,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{AsH}_3\text{O}_4, 2\text{H}_2\text{O}$ , may be obtained by dissolving equivalent quantities of quinine hydrochloride and monopotassium arsenate in hot water, mixing the solutions and boiling; after cooling the precipitate is collected, washed with cold water, dried, and recrystallised from hot diluted alcohol. By this method a salt having the above formula is obtained, but salts having different compositions are obtained by variations in the method employed. The above, however, has been preferred on account of the uniformity and stability of the product.

It occurs in white, silky needles, sparingly soluble in cold water; easily soluble in hot water. The salt contains about 66 per cent. of quinine and 29 per cent. arsenic acid.

Quinine arsenate is employed at an antiperiodic in malarial conditions. It is best administered in a pill prepared by triturating the salt with sugar of milk and massing with syrup of glucose. The action is that of arsenic; too little quinine is present to have much effect.

*Dose.*—6 to 30 milligrams ( $\frac{1}{10}$  to  $\frac{1}{2}$  grain).

**QUININÆ BENZOAS.****QUININE BENZOATE.**

Quinine benzoate,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{C}_7\text{H}_6\text{O}_2$ , may be prepared by dissolving 3 of benzoic acid and 8 of anhydrous quinine in hot alcohol, and crystallising.

It occurs in the form of small white prismatic crystals. Slightly soluble in water (about 1 in 350); also soluble in alcohol. It contains 72.65 per cent. of quinine and 27.35 per cent. of benzoic acid.

Quinine benzoate has the general properties of quinine salts, but it is not often used in medicine.

*Dose.*—1 to 12 decigrams (2 to 20 grains).

**QUININÆ CACODYLAS.****QUININE CACODYLATE.**

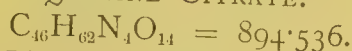
Quinine cacodylate may be prepared by the interaction of cacodylic acid and quinine, or of suitable salts of these bodies.

It occurs in the form of acicular crystals or as a white powder. Very soluble in cold water; less soluble in hot water; freely soluble in alcohol.

Quinine cacodylate is given with the cacodylates of iron and soda, in pill form or in solution.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).



**QUININÆ CITRAS.****QUININE CITRATE.**

Quinine citrate,  $(C_{20}H_{24}N_2O_2)_2H_3C_6H_5O_7 + 3H_2O$ , may be prepared by boiling 3.086 of anhydrous quinine, or 3.6 of the crystallised alkaloid, with a solution of 1 of crystallised citric acid in 100 of water. The clear solution thus obtained is filtered, allowed to cool, and crystallised. Quinine citrate may be prepared extemporaneously by mixing 0.75 of quinine (hydrated) with 0.4 of citric acid, and slightly damping the mixture with water.

It occurs in the form of white, delicate acicular crystals, having only a slightly bitter taste, owing to its insolubility. Sparingly soluble in cold water (1 in 1200), in boiling water (1 in 30), in cold alcohol (about 1 in 45), in boiling alcohol (about 1 in 3); slightly soluble in chloroform. The salt gives the thalleioquin reaction, and should respond to the tests described under Quininæ Sulphas.

Quinine citrate may be given in the form of effervescent granules, or in pills massed with glycerin of tragacanth, or it may be suspended in water. It is much less bitter than other salts of quinine.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

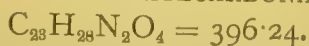
NOTE.—Various formulæ are given for this salt, but that given above agrees most closely with the citrate as found in commerce; on this basis the salt contains 72.5 per cent. of quinine.

**QUININÆ CITRAS EFFERVESCENS.****EFFERVESCENT QUININE CITRATE.**

Quinine Citrate ...	...	...	2.00
Sodium Bicarbonate, in powder	...	...	51.00
Tartaric Acid, in powder	...	...	27.00
Citric Acid, in powder ...	...	...	18.00
Refined Sugar, in powder	...	...	14.00

Mix, and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—4 to 8 grammes (60 to 120 grains).

**QUININÆ ETHYLCARBONAS.****QUININE ETHYLCARBONATE.**

Quinine ethylcarbonate,  $C_2H_5CO_3C_{20}H_{23}N_2O$ , is prepared by the action of ethyl chloro-carbonate on quinine.

It occurs in the form of white, slender, crystalline needles, or in light masses of silky, acicular crystals; it is lighter than quinine sulphate, odourless, and almost tasteless. Sparingly soluble in water; easily soluble in alcohol, ether, and chloroform; soluble in acids, forming well-defined crystalline salts which are easily soluble. The sulphuric or nitric acid solutions are as strongly

fluorescent as the corresponding quinine solutions, but are much less bitter. The tannic acid salt is insoluble. Its solutions yield the usual alkaloidal reactions. Melting-point,  $95^{\circ}$ ; on ignition it burns without leaving any residue. In its chemical behaviour quinine ethylcarbonate has a strong resemblance to quinine, having basic properties, turning red litmus blue, and forming crystalline salts with acids; it produces the thalleioquin reaction but not the Herapath reaction, and is more stable towards the action of light than quinine. On mixing about 2 decigrams of quinine ethylcarbonate with 2 to 3 mils of sodium hydroxide solution, adding a fragment of iodine, and warming, a slight odour of iodoform is developed (showing presence of the ethyl group). The nitric acid solution is not affected by solution of silver nitrate or barium nitrate (absence of quinine hydrochloride, or sulphate, especially when taken in conjunction with absence of marked bitterness).

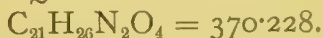
Quinine ethylcarbonate is employed as a substitute for quinine sulphate or hydrochloride, on account of its freedom from taste. It is reputed not to differ from those salts in its medicinal action.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTE.—Quinine ethylcarbonate is also known under the trade-name Euchinin or Euquinine.

### QUININÆ FORMAS.

#### QUININE FORMATE.



Quinine formate,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{COOH}_2$ , is a basic salt, and may be prepared by neutralising formic acid with its equivalent of quinine.

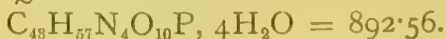
It occurs in white, crystalline, silky needles, much less bitter than the sulphate. Soluble in water (1 in 19), soluble also in alcohol and in chloroform, very slightly soluble in ether, insoluble in oils. Melting-point,  $32^{\circ}$ . Rotation  $-141.1^{\circ}$ . The aqueous solution does not become dissociated, and is alkaline in reaction. It is the most soluble salt of quinine, and contains 87.56 per cent. of the alkaloid. The neutral salt is not used in medicine on account of its instability.

Quinine formate may be given in solution, or enclosed in cachets, and is used in the preparation of various compounded medicines.

*Dose.*—6 to 30 centigrams (1 to 5 grains).

### QUININÆ GLYCEROPHOSPHAS.

#### QUININE GLYCEROPHOSPHATE.



Quinine glycerophosphate,  $(\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2)_2\text{H}_2\text{PO}_4(\text{C}_3\text{H}_7\text{O}_2), 4\text{H}_2\text{O}$ , may be prepared by decomposing a solution containing 10 of calcium glycerophosphate in 300 of water with a solution containing 34.8 of quinine hydrochloride in 1000 of water, washing the resulting precipitate with a little cold water, draining and drying; or by adding

glycerophosphoric acid in absolute alcohol to a solution of quinine in ether, collecting the abundant white precipitate formed, and washing with ether. The salt contains 72·64 per cent. of anhydrous quinine and 8·07 per cent. of water of crystallisation.

It occurs in the form of fine, white, crystalline needles, or as a white, crystalline powder, odourless and bitter, but not so intensely bitter as quinine sulphate; permanent in the air. Slightly soluble in cold water (about 1 in 200), in boiling water (1 in 100), in cold alcohol (1 in 40), and in glycerin; easily soluble in boiling alcohol, insoluble in ether. On heating to 100° it loses its water of crystallisation, and melts when anhydrous at 154°. It gives the thalleioquin reaction, and should yield no free glycerin when shaken with absolute alcohol.

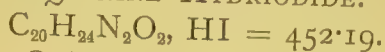
Quinine glycerophosphate may be given in cachets or in capsules.

*Dose*.—1 to 5 decigrams (2 to 8 grains).

*NOTE*.—This salt is also known under the trade-name Kineurine.

### QUININÆ HYDRIODIDUM.

QUININE HYDRIODIDE.



*Synonyms*.—Quininæ Iodidum; Quinine Iodide.

Quinine hydriodide,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_3, \text{HI}$ , may be prepared by precipitating a solution of 20 of quinine hydrochloride in 500 of hot water with a solution of 12 of potassium iodide in 30 of water. The precipitate thus obtained is washed, and dried in a dark place at a gentle heat. A mixture for extemporaneous use, composed of quinine sulphate, 95; and potassium iodide, 40, corresponds to 100 of quinine hydriodide.

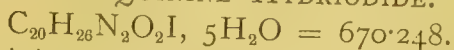
It occurs in the form of pale yellow crystals or powder. Slightly soluble in cold water; freely soluble in hot water, alcohol, and ether. It contains 71·71 per cent. of quinine, and is advised by some in tubercle and chronic rheumatism.

Quinine hydriodide has been given for tuberculosis and chronic rheumatism.

*Dose*.— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### QUININÆ HYDRIODIDUM ACIDUM.

ACID QUININE HYDRIODIDE.



*Synonyms*.—Quininæ Iodidum Acidum; Acid Quinine Iodide.

Acid quinine hydriodide,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2, 2\text{HI}, 5\text{H}_2\text{O}$ , may be prepared by adding a solution of potassium iodide to a warm solution of quinine in dilute sulphuric acid, and crystallising.

It occurs in the form of yellowish crystals or scales. Soluble in water (1 in 20). On heating, the crystals become opaque at 30° and melt at 100° in their water of crystallisation, becoming completely anhydrous at 120°. When the anhydrous salt is exposed to damp



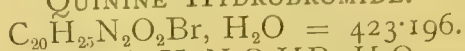
atmosphere it takes up two molecules of water. The salt contains 48.4 per cent. of quinine. It should be protected from the light.

Acid quinine hydriodide has been used for similar purposes to Quininæ Hydriodidum.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### QUININÆ HYDROBROMIDUM.

#### QUININE HYDROBROMIDE.



Quinine hydrobromide,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{HBr}, \text{H}_2\text{O}$ , may be prepared by double decomposition of quinine sulphate and barium bromide, 100 of quinine sulphate being dissolved in 800 of water by heating to boiling, and a solution of 38 of crystallised barium bromide in 250 of water added in small portions at a time, with stirring. The whole is boiled for a short time and then allowed to cool. It should be tested for the presence of barium and adjusted with a sufficiency of an aqueous solution of quinine sulphate if necessary. It is then filtered, evaporated at  $60^\circ$ ; and allowed to crystallise in the cold. The crystals after draining on filter paper are carefully dried. It may also be prepared by neutralising diluted hydrobromic acid with quinine. The salt contains 76.6 per cent. of anhydrous quinine and 4.25 per cent. of water of crystallisation.

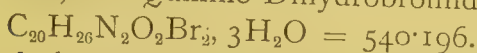
It occurs in the form of light, white, silky, acicular crystals, odourless and having a bitter taste, and is efflorescent. Soluble in cold water (about 1 in 55), in boiling water (1 in 1), in alcohol (1 in 0.7), in chloroform (1 in 10), and in glycerin. The aqueous solution is neutral, or very slightly alkaline, and is non-fluorescent. The sulphuric acid solution is fluorescent. Heated to  $100^\circ$  it loses its water of crystallisation, 4.25 per cent., equivalent to one molecule of water; at  $150^\circ$  it begins to melt, forming a syrupy liquid at  $200^\circ$ . On incineration it leaves no residue. It gives the thalleioquin reaction. It should not give more than a faintly yellow colouration with concentrated sulphuric acid (absence of readily carbonisable impurities), nor produce a red colouration with nitric acid (difference from morphine and brucine). It should not contain more than traces of sulphates, and it should not give any precipitate with diluted sulphuric acid (absence of barium salt). In order to detect the presence of other cinchona alkaloids, dry 3 grammes of the salt at  $50^\circ$  for two hours, and then dissolve it in 30 mils of hot water, in an evaporating dish; next add gradually, with constant stirring, 1.5 grammes of crystallised sodium sulphate, and evaporate to dryness. The dried residue, which should be neutral, is placed in a dry test-tube along with 30 mils of water and examined for other cinchona alkaloids as described under Quininæ Sulphas.

The amount of hydrobromic acid present in this salt is insufficient to produce any bromide action. Given with a medicinal dose of hydrobromic acid, quinine is found to produce symptoms of "quinism" less often, and the sedative action of the mixture is useful in neuralgia.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**QUININÆ HYDROBROMIDUM ACIDUM.**

ACID QUININE HYDROBROMIDE.

*Synonym.*—Quinine Dihydrobromide.

Quinine acid hydrobromide,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2, 2\text{HBr}, 3\text{H}_2\text{O}$ , may be prepared by dissolving 100 of quinine sulphate in 800 of water containing 67.5 of dilute sulphuric acid of specific gravity 1.110 to 1.140. To this solution, boiling, is added a solution of 76 of crystallised barium bromide in 200 of water, in small portions at a time, and with constant stirring. When all is added the solution is allowed to boil for a short time, and then set aside to clear. The supernatant liquid is tested for barium salt, and adjusted if necessary with a solution of quinine bisulphate so that a very slight excess of the latter finally remains. Filtered, evaporated at  $60^\circ$  to the weight of 300, and allowed to crystallise in the cold. The crystals after draining on filter paper are carefully dried. It contains 60.02 per cent. of anhydrous quinine, 29.97 per cent. of hydrobromic acid, and 10.00 per cent. of water.

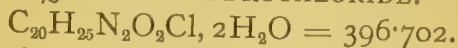
It occurs in the form of yellowish or white, prismatic crystals or powder. Soluble in cold water (1 in 7), very easily soluble in boiling water and in alcohol. The aqueous solution reddens blue litmus paper; it should not be rendered turbid by diluted sulphuric acid (absence of barium salt). It gives the thalleioquin reaction, and should respond generally to other tests described under Quinina.

On account of its ready solubility, this salt is suitable for the preparation of unirritating solutions (1 in 10) for hypodermic use. See Quininæ Hydrochloricum Acidum. Doses of 3 to 5 grains are injected daily in malaria, either subcutaneously over the splenic area, or intramuscularly in the buttock. The acid salts of quinine when given in pill form are more readily soluble in the stomach than the neutral salts.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

**QUININÆ HYDROCHLORIDUM.**

QUININE HYDROCHLORIDE.



*Synonyms.*—Hydrochlorate of Quinine; Muriate of Quinine.

Quinine hydrochloride,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{HCl}, 2\text{H}_2\text{O}$ , may be prepared by double decomposition of barium chloride and quinine sulphate, or by mixing freshly precipitated quinine with a solution containing 25 per cent. hydrochloric acid, after dilution, with fourteen times its volume of water and being warmed to about  $30^\circ$ . After standing for fifteen minutes in a warm place the mixture is heated to about  $60^\circ$ , and if necessary quinine alkaloid or diluted hydrochloric acid added to make neutral or only very slightly alkaline. The solution is set aside to crystallise. For every 10 parts of 25 per cent. hydrochloric acid the alkaloid from

30 parts of quinine sulphate should be used. The salt contains 81.73 per cent. of anhydrous quinine, 9.18 per cent. of hydrochloric acid, and 9.08 per cent. of water of crystallisation, equivalent to two molecules.

It occurs in the form of white, silky, glistening, acicular crystals, usually larger than those of quinine sulphate, odourless, and having a very bitter taste, slightly efflorescent in warm air. On exposure to light it gradually becomes yellowish in colour. Soluble in cold water (about 1 in 40), in boiling water (1 in 1), in alcohol (1 in 1), in chloroform (1 in 9). The anhydrous salt is very soluble in chloroform. Its solutions become yellowish or brownish on keeping. Heated at 100° to 120° it loses its water of crystallisation, and at 190° it melts. On complete ignition it burns without leaving any residue (absence of inorganic impurities). Its aqueous solution is neutral or only faintly alkaline to litmus paper. The concentrated aqueous solution is non-fluorescent, but on considerable dilution a slight fluorescence is perceptible, increased on addition of sulphuric acid, but disappearing on the addition of hydrochloric acid. It gives the thalleioquin reaction and should show only the slightest reactions for sulphates, but none for barium. Concentrated sulphuric acid gives no colouration (absence of easily carbonisable matter); nitric acid should give no red colouration (difference from morphine). In order to detect other cinchona alkaloids, dry 3 grammes of the salt at 50° for two hours, in 30 mls of hot water, in an evaporating dish; next add gradually, and with constant stirring, 1.5 grammes of crystallised sodium sulphate, and evaporate to dryness. The dried residue, which should be neutral, is treated with 30 mls of water, and examined for other cinchona alkaloids, as described under Quininæ Sulphas.

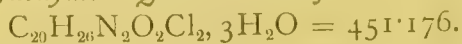
This salt has the properties of quinine sulphate, but is more easily soluble, and therefore more readily absorbed. It is less irritating to the gastric mucous membrane, and contains a larger percentage of alkaloid than the sulphate. For the common properties of quinine salts see under Quinina. It is employed as an antiseptic wash for the ear (1 in 120), and in the form of pessary (3 or 5 grains in each with cacao butter) in leucorrhœa. It is a better salt of quinine than the sulphate for general use.

*Dose.*— $\frac{1}{2}$  to 6 decigrams (1 to 10 grains).

## QUININÆ HYDROCHLORIDUM ACIDUM.

ACID QUININE HYDROCHLORIDE.

*Synonym.*—Quinine Dihydrochloride.



Quinine acid hydrochloride,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2, 2\text{HCl}, 3\text{H}_2\text{O}$ , may be prepared by adding a solution of 4.45 of barium chloride in 50 of water to a solution of 10 of quinine acid sulphate in 50 of water. The two solutions are mixed, and, after standing for some time, filtered. The filtrate is tested for barium and



adjusted, if necessary, with solution of quinine sulphate, evaporated, and set aside to crystallise. It may also be prepared by dissolving 10 parts of quinine hydrochloride in 20 parts of water, and adding 3·7 parts of 25 per cent. hydrochloric acid, filtering and crystallising.

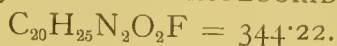
It occurs in the form of white, glistening crystals, or as a dry, white, crystalline powder, odourless, and having a very bitter taste. Soluble in water (2 in 1½), in alcohol (1 in 5), in chloroform (1 in 7), insoluble in ether. The aqueous solution has an acid reaction. According to the official formula, the salt should contain 71·86 per cent. of anhydrous quinine, 16·15 per cent. of hydrochloric acid, and 11·98 per cent. of water of crystallisation, equivalent to three molecules, and at a temperature of 100° it is said to lose not more than 12 per cent. of water, when it becomes opaque and loses its brilliancy; but the salt as found in commerce is practically anhydrous. It should not contain more than the slightest traces of sulphates, and should be free from barium. It should respond to the identification tests and be free from more than traces of other cinchona alkaloids, when converted into the sulphate as described in the previous monograph, and examined as further described under Quininæ Sulphas.

This salt is employed principally for hypodermic use; solutions may be prepared containing 1 grain in 5 minims, and may be used in malaria, ague, rheumatism, typhoid fever, or whenever quinine by the mouth causes gastric irritation (see Quininæ Hydrobromidum Acidum).

*Dose.*—½ to 6 decigrams (1 to 10 grains).

## QUININÆ HYDROFLUORIDUM.

QUININE HYDROFLUORIDE.



*Synonyms.*—Quininæ Fluoridum; Quinine Fluoride.

Quinine hydrofluoride,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{HF}$ , is a salt of the alkaloid quinine. The salt contains 94·17 per cent. of anhydrous quinine and 5·82 per cent. of hydrofluoric acid.

It occurs in the form of colourless crystals, or as a white or whitish amorphous powder. Insoluble in water, but soluble in alcohol.

Quinine hydrofluoride has been recommended for use with iron fluoride in rickets and enlarged spleen. Like all such recommendations its use is empirical. It is best administered in cachets.

*Dose.*—6 to 12 centigrams (1 to 2 grains).

## QUININÆ HYPOPHOSPHIS.

QUININE HYPOPHOSPHITE.



Quinine hypophosphite,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{HPH}_2\text{O}_2$ , may be obtained by mixing a solution of 25 of quinine sulphate in 400 of

alcohol with a solution of 5 of calcium hypophosphite in 120 of water, allowing to stand for about an hour, and then filtering. The filtrate is concentrated to about two-thirds of its volume and set aside to crystallise. The crystals are collected, gently pressed between filter paper, and carefully dried. It contains 83·08 per cent. of anhydrous quinine, and 16·91 of hypophosphorous acid.

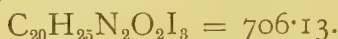
It occurs as a colourless, loose, crystalline salt, consisting of very small prisms, or as an amorphous powder. Soluble in water (1 in 250), in alcohol (1 in 40).

This salt of quinine is recommended with the hypophosphites of sodium, potassium, calcium, and iron in phthisis and neurasthenic conditions, as in Syrupus Hypophosphitum Compositus.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### QUININÆ IODOHYDRIODUM.

QUININE IODO-HYDRIODIDE.



*Synonyms.*—Quininæ Diiodo-hydriodidum; Quinine Periodide; Iodised Quinine Hydriodide.

Quinine iodo-hydriodide,  $C_{20}H_{24}N_2O_2$ ,  $HI + I_2$ , may be prepared by precipitating a solution of a quinine salt with a solution of iodine in potassium iodide; or extemporaneously by triturating 70 of quinine hydrochloride, 50 of potassium iodide, and 20 of iodine, with a little alcohol; this corresponds to 100 parts of quinine iodo-hydriodide.

It occurs as a reddish-brown amorphous powder, insoluble in water or alcohol. It contains 45·9 per cent. of quinine, and is rich in iodine, which is liberated readily from the salt.

Quinine iodo-hydriodide has been employed in syphilitic disorders, and was formerly recommended for use in rheumatism.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  decigrams (1 to 4 grains).

### QUININÆ LACTAS.

QUININE LACTATE.



Quinine lactate,  $C_{20}H_{24}N_2O_2 \cdot C_3H_6O_3$ , may be prepared by adding 10 of quinine to about 150 of hot water, and neutralising it with a sufficiency of lactic acid of 75 per cent. (3·2 parts), and boiling the liquid. The neutral solution is filtered while still hot, evaporated at a temperature not exceeding 60°, and allowed to crystallise. It contains 78·26 per cent. of anhydrous quinine, and 21·73 per cent. of lactic acid.

It occurs in the form of colourless, prismatic needles, resembling quinine sulphate in appearance, or as a white crystalline or granular amorphous powder; anhydrous. Soluble in cold water (about 1 in 6), in boiling water (1 in less than 1), very soluble in alcohol, nearly

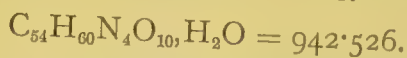
insoluble in ether. The solutions are neutral. It is stated that a strong aqueous solution of 1 in 4, for hypodermic use, may be made by neutralising the alkaloid with lactic acid and evaporating to the required bulk.

Quinine lactate is employed hypodermically, and 1 per cent. solutions are used as an injection in gonorrhœa.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

## QUININÆ SALICYLAS.

### QUININE SALICYLATE.



Quinine salicylate,  $(\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{HC}_7\text{H}_5\text{O}_3)_2, \text{H}_2\text{O}$ , may be prepared by dissolving 3.89 of sodium salicylate in 120 of water, heating to boiling, and adding 10 of quinine sulphate, with constant stirring. The difficultly soluble quinine salicylate which is instantly formed is thrown out as a crystalline precipitate. When cold the precipitate is collected, washed with cold water until free from sulphates, drained between filter paper, and allowed to dry in the air. It may also be prepared by neutralising an alcoholic solution of quinine with salicylic acid, concentrating the solution, and crystallising. It crystallises from alcohol in anhydrous prisms. The salt contains 68.79 per cent. of anhydrous quinine, 29.29 per cent. of salicylic acid, and 1.91 per cent. of water of crystallisation.

It occurs in the form of white, silky, acicular crystals, or as a slightly crystalline powder, permanent in the air, assuming a pinkish colour on keeping. Soluble in cold water (1 in 230), in alcohol (1 in 24), in chloroform (1 in 25); the addition of mineral acids increases the solubility, but only by decomposing the salt with liberation of salicylic acid, which, under certain conditions, may separate in crystalline form. The aqueous solution is alkaline to red litmus paper, and has a bitter taste, and when treated with diluted sulphuric acid assumes the characteristic blue quinine fluorescence. Heated at 100° it loses its water of crystallisation (rather less than 2 per cent.). At 183° it begins to melt, with decomposition; at 187° is wholly melted, forming a red liquid; and on complete ignition it slowly burns, without leaving any residue. It gives the thalleioquin reaction. Sulphuric acid, containing about one-fifth of its volume of formaldehyde, yields a pink colouration. It should not contain more than traces of chlorides or sulphates, and should prove to be free from excessive amounts of other cinchona alkaloids when treated as follows:—Mix 2 grammes of the salt with 10 mls of water in a separator, add a slight excess of ammonia, extract the alkaloid by shaking with ether several times, evaporate the ethereal solution, dissolve the residual alkaloid in alcohol, and exactly neutralise it with sulphuric acid; then evaporate the neutral solution to dryness, and conduct the examination as described under Quininæ Sulphas.



This salt of quinine is sometimes employed in acute rheumatism and rheumatic gout for its action on metabolism, as an antiseptic and antipyretic in typhoid fever, and as an analgesic in neuralgia. It is best prescribed in cachets or pills, or suspended in water with Pulvis Tragacanthæ Compositus. It should not be prescribed with mineral acids, which decompose the salt, sometimes with deposition of crystals of salicylic acid. It may conveniently be given as Quininæ Salicylas Effervescens.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### QUININÆ SALICYLAS EFFERVESCENS.

#### EFFERVESCENT QUININE SALICYLATE.

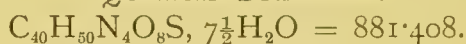
Quinine Salicylate	...	...	...	2'00
Sodium Bicarbonate, in powder	...	...	...	51'00
Tartaric Acid, in powder	...	...	...	27'00
Citric Acid, in powder	...	...	...	18'00
Refined Sugar, in powder	...	...	...	14'00

Mix, and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—4 to 8 grammes (60 to 120 grains).

### QUININÆ SULPHAS.

#### QUININE SULPHATE.



Quinine sulphate,  $(\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2)_2\text{H}_2\text{SO}_4, 7\frac{1}{2}\text{H}_2\text{O}$ , may be prepared by mixing the finely powdered bark with milk of lime, and exhausting the mixture with hot kerosene, or other solvent, from which, after concentration, the alkaloids are extracted as acid sulphates by means of diluted sulphuric acid. The acid solution is treated with animal charcoal, filtered while hot, and neutralised with solution of sodium hydroxide, when, on cooling, neutral quinine sulphate crystallises out, separating from the other sulphates which are more soluble, and consequently remain in the mother-liquor. The quinine sulphate is purified by recrystallisation. The salt contains 73·55 per cent. of anhydrous quinine, 11·12 per cent. of sulphuric acid, and 15·32 per cent. of water of crystallisation.

It occurs in the form of white, flexible, silky, filiform crystals, odourless, and having a persistent and intensely bitter taste; efflorescent on exposure to dry air, becoming lustreless and acquiring a brownish tint on exposure to light. It may be either light or heavy according to the method of manufacture, but in either case it forms an easily compressible mass. Soluble in cold water (about 1 in 800), in boiling water (1 in 25), in cold alcohol (1 in 65), in boiling alcohol (1 in 6), almost insoluble in ether or chloroform, easily soluble in a mixture of 2 parts of chloroform and 1 part of absolute alcohol; diluted acids increase its solubility in water. The aqueous solutions are neutral and fluorescent, and when treated with solution of bromine or chlorine and then solution of ammonia yield the char-

acteristic emerald-green colour, or thalleioquin reaction, and this on further treatment with mineral acids changes to red; with alkalis and their carbonates the alkaloid is precipitated, but in the case of ammonia is redissolved by excess; tannic acid forms an insoluble tannate. The fluorescence of the aqueous solution is intensified by the addition of diluted sulphuric acid. In dry air the salt effloresces and loses all but two molecules of its water of crystallisation. At  $100^{\circ}$  the salt becomes anhydrous, and when exposed to the air again takes up two molecules of water, so that a perfectly stable salt ( $C_{20}H_{24}N_2O_2$ )<sub>2</sub>,  $H_2SO_4$ ,  $2H_2O$  results. It melts at  $205^{\circ}$  when dried over sulphuric acid. On ignition it burns without leaving any residue (absence of mineral impurities). Concentrated sulphuric acid should not produce more than a faintly yellow colour (limit of readily carbonisable impurities), and nitric acid should not produce a red colour (difference from morphine). The impurity most frequently present in quinine sulphate is cinchonidine sulphate resulting from imperfect separation in the process of manufacture. Commercial quinine sulphate, however, may be obtained practically free from cinchonidine. This and other cinchona alkaloids should be tested for in the following way:—Dry 2 grammes of the salt at  $50^{\circ}$  for two hours in a porcelain dish on a water-bath. The residue, which must be perfectly neutral, is transferred to a dry test-tube, and 20 mils of water added. It is then heated on a water-bath for half an hour at  $65^{\circ}$ , allowed to cool to  $15^{\circ}$ , at which temperature it is kept for two hours with occasional shaking. The solution is then filtered, 5 mils of the filtrate being transferred to a dry test-tube, and solution of ammonia carefully added from a burette until the precipitate just redissolves; not more than 6 mils of solution of ammonia should be required to produce a clear solution. The temperature of the liquids must be at  $15^{\circ}$ . A clear solution indicates absence of excessive amounts of other cinchona alkaloids.

Quinine sulphate is the most commonly used salt of quinine, though for general purposes the hydrochloride is preferable (see *Quininæ Hydrochloridum*). One grain of quinine sulphate is rendered soluble by 1 minim of diluted sulphuric or nitric acid, or 2 minims of diluted phosphoric acid; the acid should in each case be diluted with six to ten times its bulk of water before adding the quinine salt. For the general properties of the salts of quinine see *Quinina*. Large doses are given in malarial and intermittent fevers, smaller doses in continued fevers, neuralgia, and as a "tonic," to improve the appetite. For external use, solutions (1 in 200) are employed, with a spray or nasal douche in hay fever; for corneal ulcers 1 in 500 is used and the salt dissolved with a minimum of diluted sulphuric acid, or preferably the acid sulphate is employed. Quinine may be given internally, mixed with milk, or in cachets, pills, or mixture. The official pill contains tartaric acid to assist solution of the alkaloid in the stomach; quinine pills may also be prepared with syrup of glucose. If the bitterness of quinine in solution be objectionable

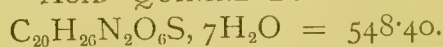
the alkaloidal salt may be suspended in water with the aid of Pulvis Tragacanthæ Compositus. It dissolves readily in tincture of perchloride of iron, and is frequently so prescribed. Quinine is incompatible with alkalis and their carbonates (*e.g.*, Spiritus Ammoniaë Aromaticus), benzoates, salicylates, iodides, tannic acid, and perchloride of mercury. These substances precipitate the alkaloid or form insoluble salts, which become adherent to the sides of the bottle; the addition of mucilage of acacia usually keeps the precipitated alkaloid in a diffusible condition. When reacting salts are present in quinine mixtures, the salt should be added in as dilute solution as possible to the quinine solution, also dilute, containing the mucilage. Mixtures of sodium salicylate with quinine should contain no free acid; the quinine salt should be suspended with a little mucilage and the sodium salicylate added in solution. Effervescent mixtures of acid and alkaline solutions should contain the quinine in the acid portion. For hypodermic use the acid hydrobromide and acid hydrochloride are preferred. Ammoniated tincture of quinine is largely employed. When diluted with water the quinine is thrown out of solution, and mucilage should be added to the mixture to retain the precipitate in a diffusible condition. Poured into aerated water or hot water, the alkaloid is not so readily thrown out of solution.

*Dose.*— $\frac{1}{2}$  to 6 decigrams (1 to 10 grains).

*NOTES.*—Quinine sulphate supplied for Government use in India is coloured pink, as a guarantee of purity and to distinguish it from commercial salts which have not had their quality determined by analysis; the importation into India of salts of quinine which have been coloured pink is therefore restricted.

## QUININÆ SULPHAS ACIDUS.

ACID QUININE SULPHATE.



*Synonyms.*—Quininæ Bisulphas; Quinine Bisulphate; Neutral Quinine Sulphate.

Quinine acid sulphate,  $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_6, \text{H}_2\text{SO}_4, 7\text{H}_2\text{O}$ , may be prepared by dissolving 10 of ordinary quinine sulphate in a mixture of 15 of water and 6.85 of diluted sulphuric acid (specific gravity, 1.110 to 1.114) on a water-bath at a temperature not exceeding 60°. The warm solution is filtered and allowed to cool. after standing for one day in the cold the quinine acid sulphate crystallises out and may be drained and dried over sulphuric acid at a temperature of 10° to 15°. The salt contains 59.12 per cent. of anhydrous quinine, 17.88 per cent. of sulphuric acid, and 22.99 per cent. of water of crystallisation.

It occurs in the form of transparent, colourless, or white, glistening, rhombic crystals, or small needles, odourless, and having a very bitter taste; efflorescent in dry air, and turning yellow on exposure to light. Soluble in water (1 in 10), in alcohol (1 in 45). The aqueous solution is strongly acid, shows a blue fluorescence,



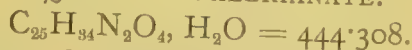
and gives the thalleioquin reaction. On heating, the salt softens at  $60^{\circ}$ , becomes semi-fluid at  $70^{\circ}$ , and melts at about  $160^{\circ}$  with decomposition, being converted into acid quinicine sulphate, which forms with diluted sulphuric acid a yellow, but non-fluorescent solution. At  $100^{\circ}$  it loses all its water of crystallisation. On ignition the salt is slowly consumed without leaving any residue. With concentrated sulphuric acid not more than a faint yellow colouration is produced (limit of readily carbonisable impurities). It should be free from chlorides. The presence of other cinchona alkaloids should be tested for by dissolving 2 grammes of the salt, dried at  $50^{\circ}$  for two hours, in 20 mils of water, carefully neutralising with diluted solution of sodium hydroxide, evaporating to dryness, and completing the examination as described under *Quininæ Sulphas*.

This salt is much more soluble than ordinary quinine sulphate, and thus possesses similar advantages to other acid salts of quinine (see *Quininæ Hydrobromidum Acidum* and *Quininæ Hydrochloridum Acidum*).

*Dose.*— $\frac{1}{2}$  to 6 decigrams (1 to 10 grains).

### QUININÆ VALERIANAS.

QUININE VALERIANATE.



Quinine valerianate,  $C_{20}H_{24}N_2O_2 \cdot HC_5H_9O_2, H_2O$ , may be prepared by dissolving quinine in the least possible quantity of alcohol and adding valerianic acid in small quantities at a time, until the solution is neutral or only very faintly acid. It is then poured into twice its volume of water, allowed to evaporate at a temperature not exceeding  $50^{\circ}$ , and then crystallised. The salt contains 72.97 per cent. of anhydrous quinine, 22.97 per cent. of valerianic acid, and 4.05 per cent. of water of crystallisation.

It occurs in the form of colourless, lustrous, pearly crystals, or as a white, microcrystalline powder, having a slight odour of valerianic acid and a bitter, somewhat valerian-like taste; permanent in air. Soluble in cold water (1 in 120), in boiling water (1 in 40), in alcohol (1 in 2), in ether (1 in 14). Melting-point,  $90^{\circ}$ , forming a colourless liquid. At  $100^{\circ}$  it loses its water of crystallisation, and at the same time begins to lose valerianic acid. On ignition it burns slowly, leaving no residue (absence of fixed impurities). On adding diluted sulphuric acid to the aqueous solution it becomes fluorescent and gives a more pronounced odour of valerianic acid. It gives the thalleioquin reaction. When converted into sulphate and examined as described under *Quininæ Sulphas* it should be free from excessive traces of other cinchona alkaloids.

This compound is employed with the valerianates of iron and zinc in neurotic conditions and hysteria. It is prescribed in pills, which should be massed with syrup of glucose and well varnished.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

**RANUNCULUS FICARIA.**

## PILEWORT.

*Synonym.*—Lesser Celandine.

Pilewort is the fresh herb of *Ranunculus Ficaria*, Linn. (N.O. Ranunculaceæ), a very common herbaceous plant.

The stem, which is decumbent, produces petiolate, broadly ovate or reniform glabrous leaves, with crenate margin and cordate base. The flowers are supported on long peduncles, and possess three sepals and eight to twelve bright yellow, glossy petals, at the base of each of which is a nectary covered with a small scale. Several of the roots enlarge to oblong, somewhat club-shaped tubercles. The somewhat acrid taste is destroyed by boiling, and the leaves are then edible.

Nothing definite is known concerning the constituents of pilewort, but the fresh plant probably contains traces of an acrid principle resembling, or identical with, anemonin.

Pilewort is an old remedy for hæmorrhoids, which has recently been re-introduced; it is used in the form of ointment and suppositories.

**RESINA.**

## RESIN.

*Synonyms.*—Rosin; Colophony.

Resin is the residue left after the removal, by distillation, of the oil of turpentine from the crude oleoresin of *Pinus palustris*, Mill., *P. Taeda*, Linn., and other species (N.O. Coniferæ) growing in Europe and the south-eastern United States. In the collection of the oleoresin in America a cavity is cut in the base of the tree-trunk during the winter, into which a small quantity of the secretion contained in the normal secretion ducts is discharged. The injury thus inflicted on the tree induces the abundant formation of abnormal oleoresin ducts in the new wood. In the following spring a triangular incision is cut above the cavity, from which a much larger discharge of the oleoresin contained in these abnormal ducts takes place. Further hacking carried on at intervals during the summer results in further formation of abnormal oleoresin ducts and discharge of the oleoresin, large quantities of which are thus produced. This is then distilled with water, oil of turpentine passing over, and resin (colophony) remaining in the still; the fused resin is poured while still hot through wire strainers into barrels, where it solidifies. The oleoresin obtained at first yields about 80 per cent. of pale yellow (amber) resin; later products contain more resin but darker in colour (black resin). Long-continued application of heat also causes darkening in the colour of the resin, whilst if the water is not entirely removed an opaque resin is obtained.

It should occur in amber-coloured, translucent, compact masses, with a brittle, glassy fracture. The odour and taste are slightly terebinthinate. It is soluble in almost all proportions of alcohol, oil of turpentine, ether, benzene and carbon bisulphide, fixed and volatile oils, and in solutions of caustic soda or potash. It is easily

fusible and burns with a dense, yellowish smoke, leaving no appreciable ash. Specific gravity, 1.070 to 1.080. Acid number, 150 to 180, and practically identical with the saponification number.

The composition of colophony is still a matter of uncertainty. It appears to consist of three isomeric abietic acids ( $\alpha$ ,  $\beta$ , and  $\gamma$ ), together with a small quantity (5 to 6 per cent.) of resene and traces of volatile oil. The resin acids appear to undergo change (probably oxidation) when exposed to the air, and become less soluble in petroleum spirit.

Resin is an ingredient of ointments and plasters, to be used as stimulating applications to the skin. Emplastrum Resinæ is used as an adhesive plaster in minor surgery for strapping wounds. Unguentum Resinæ is applied as a stimulant to indolent ulcers, boils, etc. Resin was formerly given internally in rheumatism, sometimes with guaiacum resin. It is partly absorbed and excreted by the urine, and during excretion excites the kidneys to diuresis. Sometimes so much has been excreted in the urine that nitric acid has caused a precipitate of the resin simulating albumen; the precipitate is readily distinguished from albumen in that it is soluble in alcohol.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

*NOTES.*—For pharmaceutical use resin should be pale in colour, possess a high acid number, and be almost entirely soluble in petroleum spirit. By destructive distillation it yields "resin spirit" and "resin oil." Resin spirit has, when rectified, a specific gravity about 0.864, and distils mainly between 160° and 200°. Resin oil is used for lubricating purposes. Venice turpentine is collected in South Tyrol by boring the trunk of the larch and collecting the oleoresin that slowly fills the cavity. It is a yellowish, turbid oleoresin, consisting chiefly of  $\alpha$ - and  $\beta$ -larinolic acid (55 to 60 per cent.), volatile oil (20 per cent.), and resene (14 per cent.). A mixture of turpentine and resin is often substituted for Venice turpentine.

## RESINA CARBOLISATA.

### CARBOLISED RESIN.

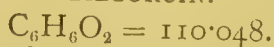
Carbolic Acid	...	...	...	...	...	35.00
Resin, in powder...	...	...	...	...	...	45.00
Chloroform	...	...	...	...	...	20.00

Rub the carbolic acid with the powdered resin; transfer to a stoppered bottle, add the chloroform, and shake until dissolved.

This preparation is used to relieve toothache, and as a temporary antiseptic stopping for decayed teeth. The cavity of the tooth should be dried with a piece of cotton wool before inserting a pledget of wool soaked with carbolised resin.

## RESORCINUM.

### RESORCIN.



*Synonyms.* — Meta-dihydroxy-benzene; Meta-dioxy-benzolum; Resorcinol.

Resorcin is  $\text{C}_6\text{H}_4(\text{OH})_2$ , a dihydric phenol, which may be prepared by fusing sodium hydroxide with sodium metabenzenedisulphonate



for eight or nine hours, cooling, dissolving in boiling water, adding hydrochloric acid, and boiling until all sulphur dioxide is evolved. The solution is then cooled and filtered, the filtrate extracted with ether, and the latter evaporated. The product thus obtained is purified by sublimation, and recrystallisation from water or benzene.

It occurs in the form of white, or nearly white, glistening needle-shaped, or prismatic crystals, having a faint, peculiar, characteristic odour, and an unpleasant, sweetish, pungent taste, followed by bitterness. It becomes rose-coloured on exposure to light and air, and should therefore be preserved in well-stoppered, dark amber-coloured bottles. Soluble in cold water (4 in 3), more so in boiling water; in cold alcohol (4 in 3), more so in boiling alcohol; in ether (1 in 1), in glycerin (1 in 1), in olive oil (1 in 22); very slightly soluble in chloroform, carbon bisulphide, or benzene. The aqueous solution (1 to 2) is colourless, neutral, or only very slightly acid; it should give off no odour of phenol on gently heating. It coagulates albumen; strong solutions have a caustic action on the skin. In presence of alkali the aqueous solution rapidly darkens, and acquires a strong green fluorescence. It melts at  $119^{\circ}$ , forming a colourless liquid; boils at  $276^{\circ}$ , but sublimes at a much lower temperature, volatilising completely in white vapours. On ignition it should leave no residue (absence of inorganic impurities), nor should it evolve any odour of phenol. On carefully fusing with sodium nitrite it yields lacmoid, a blue colouring matter similar to litmus. The addition of ferric chloride to a weak aqueous solution produces a bluish-violet colouration, changing to brownish-yellow on the addition of ammonia water (distinction from catechol and quinol). Ammoniacal copper and silver solutions are reduced when heated with it. Lead acetate produces no precipitate in the aqueous solution (distinction from, and absence of, catechol). If 1 decigram be dissolved in 1 mil of solution of potassium hydroxide, and a drop of chloroform added, the mixture on being heated will assume an intense crimson colour, changing to a pale straw-yellow on the addition of a slight excess of hydrochloric acid. On warming 5 centigrams with 1 decigram of tartaric acid and 5 decimils of concentrated sulphuric acid, a dark crimson-red liquid is formed; this becomes pale yellow on dilution with water. The aqueous solution with bromine water yields crystalline needles of tribromo-resorcin. The most characteristic test for resorcin is to heat it to the melting-point for a few minutes with an equal weight of phthalic anhydride, dissolve in diluted sulphuric acid and add ammonia, when a splendid yellowish-green fluorescence is produced, owing to formation of resorcin-phthalein, or fluorescein. Small quantities of resorcin may be detected by adding nitric acid containing nitrous acid to an ethereal solution of resorcin and allowing to stand, when diazo-resorcin crystallises out. These crystals give a blue solution with ammonia. Resorcin is eliminated largely by the urine, and may be detected therein by ferric chloride, which produces a violet colouration.

Resorcin was formerly given internally, but its use as an antipyretic has been abandoned on account of its readiness to form met-hæmoglobin and the danger of collapse. It is more powerfully antiseptic than phenol, but is perhaps less poisonous and irritating. It is employed as a gargle (3 per cent.); as a spray in diphtheria and whooping-cough (2 per cent.). Solutions and ointments (5 to 10 per cent.) are used as antiseptic applications in skin diseases and for the local treatment of laryngeal tuberculosis. It is a useful antipruritic, and ointments containing resorcin with zinc oxide are used in eczema and other irritable skin affections (see Unguentum Resorcini Compositum). It is much used as an antiseptic application to the scalp to remove dandruff (2 per cent.), but may slightly discolour fair hair (see Spiritus Resorcini). Medicated soaps are prepared, containing resorcin, with or without salicylic acid and sulphur. Resorcin is incompatible with alkalies and with Spiritus Ætheris Nitrosi.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains), well diluted.

*NOTES.*—The name resorcinol has been wrongly applied to a reddish-brown powder prepared by melting together equal parts of resorcin and iodoform. An 8 per cent. solution of resorcin in distilled water is known as Andeer's Lotion; it is employed as an application to syphilitic sores and foul ulcers. Thioresorcin is a yellowish powder of indefinite composition which has been used as a substitute for iodoform, but its use is attended by unpleasant symptoms.

## RHEI RADIX.

RHUBARB ROOT.

*Synonyms.*—Rheum; Rhubarb; Chinese, Turkey, East Indian, or Russian Rhubarb.

Rhubarb is the rhizome of *Rheum palmatum*, Linn., *R. officinale*, Baill. (N.O. Polygonaceæ), and probably other species collected in China and Thibet, deprived of more or less of its cortex and dried. The Chinese rhubarb of commerce is derived from at least two (probably three) species of *Rheum* growing in the mountains of the western Chinese provinces of Szechwan, Kansu, and Shensi, and the adjoining Thibetan territory. The rhizomes of the wild plants are collected, trimmed, pared, halved longitudinally if of large size, and strung on cords to dry in the sun, the drying being often completed by stove heat. It is conveyed to Shanghai, whence it is imported to London. It formerly reached Europe by way of the Levant (Turkey rhubarb), India (East Indian rhubarb), or Russia (Russian rhubarb), the commercial names indicating only the route by which it reached the European market.

Three varieties of Chinese rhubarb are distinguished in English commerce, viz., Shensi, Canton, and high dried, the latter being of Shensi or Canton character. Each variety may occur in entire rhizomes (rounds) or halved (flats). Shensi rhubarb occurs in nearly cylindrical or plano-convex pieces, often 7.5 to 15 centimetres long and 4 to 10 centimetres wide, covered with a bright yellowish-

brown powder or "coat." They are hard, heavy, and compact; the fracture is uneven and the fractured surface exhibits a characteristic marbled appearance of whitish veins on a dark reddish or greyish ground ("nutmeg" fracture). The outer surface often exhibits a rhomboidal network of whitish lines and scattered star spots (fibro-vascular bundles). The section exhibits near the periphery a dark line (cambium), exterior to which are the very narrow (1 millimetre) remains of the cortex. Within the cambium is a narrow radiate normal wood, on the inner border of which occurs a circle of star-shaped spots, which commonly more or less fuse together. The aromatic odour is characteristic; the taste is bitterish and astringent. Canton rhubarb closely resembles the Shensi variety, but may be distinguished by the granular (not veined) fracture, the more fibrous and tougher nature, and the more empyreumatic odour and taste. High-dried rhubarb may resemble either Shensi or Canton in the appearance of the fractured surface; it is distinguished by its duller, rougher coat, hardness, and strong empyreumatic odour and taste; the "rounds" are often shrunk, often exhibit the remains of a large bud at the apex and brownish patches on their outer surface. Of these varieties Shensi is the most esteemed and alone agrees with the official description; Canton is the next best, while the dark coloured, high dried "round" is the least valued. Powdered rhubarb is characterised by its very large, rosette crystals (up to  $145\mu$ ) of calcium oxalate, by its simple rounded (10 to  $18\mu$ ) or compound starch grains, by its large vessels and by frequent parenchymatous cells filled with a reddish-brown, amorphous substance.

The constituents of rhubarb are not yet completely known. The most important appear to be a number of tannoid substances and a number of purgative constituents, the former being astringent and the latter laxative. Three crystalline tannoids have been isolated, viz., catechin, glucogallin, and tetrarin. The catechin closely resembles the catechin of gambier. Glucogallin and tetrarin are glucosides. Glucogallin yields by hydrolysis gallic acid and dextrose, while tetrarin yields gallic acid, cinnamic acid, dextrose, and crystalline rheosmin. The purgative constituents apparently exist in the form of an unstable, crystalline substance, rheopurgarin. Rheopurgarin readily splits up into four glucosides, all of which yield by hydrolysis anthraquinone derivatives and (probably) glucose. Two of these viz., chrysophanein and rheochrysin, have been obtained in the crystalline condition; they yield chrysophanic acid and rheochrysidin (rhabarberone; isoemodin) respectively. The other two glucosides have not yet been isolated, but they appear to yield emodin and rhein. The drug also contains starch, calcium oxalate, etc. It yields a very variable amount of ash, ranging usually from 7.5 to 15 per cent., but attaining in exceptional instances much higher figures. The attempt has been made to effect a valuation of rhubarb by colorimetrically determining the amount of emodin (free and combined) which is contained in it, but the process is of very doubtful value.



Rhubarb root increases the flow of saliva when chewed, and acts as a stomachic in atonic dyspepsia. Large doses are purgative; they increase peristalsis without producing inflammation of the intestines. Purgation is followed by an astringent effect owing to the tannin present. Rhubarb root is employed in diarrhœa due to irritating substances in the intestines, the after-astringent effect checking the diarrhœa. For its stomachic properties, powdered rhubarb is given in cachets, powders, or mixtures, often with bicarbonate of soda and oil of peppermint. Small doses of compound tincture or infusion may replace the powdered drug. *Pulvis Rhei Compositus* and *Syrupus Rhei* are employed as laxatives for delicate persons and children. Preparations of rhubarb are suitable as occasional aperients, but should not be used in chronic constipation. A variable amount is absorbed, and imparts a brownish colour to the urine, which is changed to a purplish-red on the addition of alkali.

*Dose*.—1 to 2 grammes (15 to 30 grains), or 2 to 6 decigrams (3 to 10 grains) for repeated administration.

*NOTES*.—Two other varieties of rhubarb are met with in English commerce, viz., the rhizomes and roots of *R. officinale*, Baill. (cultivated in England), and of *R. rhaponticum*, Linn. The former may be distinguished from Chinese rhubarb by its less rich colour, shrunken appearance, and parallel instead of reticulate markings. The star spots are much less developed. The latter are also shrunken in appearance, more or less distinctly pink in colour, and exhibit a diffuse circle of isolated star spots on the transverse section. Rhapontic rhubarb contains no emodin, rhein, or rhabarberone, but has in it a crystalline body, rhaponticin, the presence of which can be demonstrated by the following test:—Boil 10 grammes with 50 mils of dilute alcohol for fifteen minutes, filter, concentrate to mils and shake with 10 to 15 mils of ether. On standing, a considerable quantity of a minutely crystalline deposit of rhaponticin will be formed. This test will serve to identify the drug obtained from *R. rhaponticum*. The roots of these cultivated species of *Rheum* are easily distinguished from the rhizomes by their smaller size and distinctly radiate structure.

## RHÆADOS PETALA.

### RED POPPY PETALS.

Red poppy petals are obtained from *Papaver Rhœas*, Linn. (N.O. Papaveraceæ), a herb common in England and throughout Europe.

The fresh petals are of a bright scarlet colour, with a short, dark violet claw, broadly elliptical, about 5 centimetres across. The upper surface is shiny, the margin entire, though often crinkled, on account of the crumpled æstivation. Odour, heavy and unpleasant; taste, slightly bitter.

The chief constituent of the fresh petals is the colouring matter, which consists of rhœadic and papaveric acids. A small quantity of morphine is also present (0·1 to 0·7 per cent. in the dried petals), and all parts of the plant contain a crystalline, non-poisonous alkaloid, rhœadine. Whether meconic acid is a constituent of the petals has not yet been definitely determined. The drug yields when dried from 16 to 20 per cent. of ash.

Red poppy petals are used in the preparation of Syrupus Rhœados as a colouring agent.

NOTES.—The long-headed poppy, *P. dubium*, Linn., is often mistaken for *P. Rhœas*. Although widely distributed it is not so common as the latter, and may be distinguished by its oblong capsule. Its petals should not be substituted for the red poppy petals, as the plant contains an alkaloid resembling thebaine in action rather than morphine.

## RICINI SEMINA.

### CASTOR OIL SEEDS.

Castor oil seeds are obtained from *Ricinus communis*, Linn. (N.O. Euphorbiaceæ), a native of India. The plant is cultivated in tropical and subtropical countries generally.

They are oblong and somewhat flattened, from 8 to 12 millimetres or more in length, with an arched-dorsal surface, and nearly flat ventral surface. The thin, brittle, glossy seed-coat varies in colour from greyish-brown to grey, and is mottled with reddish-brown or black spots and stripes, thus differing from croton seeds, which are of a uniform, dull cinnamon-brown colour. At one extremity of the seed there is a prominent and usually pale-coloured caruncle, from which the raphe runs as a distinct line to the other extremity, where it terminates in a raised chalaza. A delicate, silvery-white membrane inside the seed-coat surrounds a large yellowish-white, oily endosperm, which encloses the embryo and two papery cotyledons. The fresh seeds have only a slight odour, and a sweetish but slightly acrid taste, but they readily acquire a rancid odour.

The chief constituent of the seeds is about 50 per cent. of fixed oil (see Oleum Ricini), but a purgative substance, named ricinone, and a poisonous albumose named ricin, have been obtained from the cake left after extraction of the oil. Even so small a dose of ricin as  $\frac{1}{25000000}$  of the body weight may cause toxic symptoms. Castor oil seeds are, therefore, poisonous, and two or three seeds have been known to prove fatal.

## ROSÆ CANINÆ FRUCTUS.

### HIPS.

Hips are the fresh fruits of *Rosa canina*, Linn. (N.O. Rosaceæ), and other indigenous allied species.

The ripe fruit of the dog rose is ovoid, smooth, shining, and of a scarlet or red colour. It is crowned with five calyx teeth, beyond which a dense tuft of styles shortly protrudes. The fruit consists of the fleshy, hollow receptacle (to which the calyx tube is united), bearing on its inner surface a number of small, hairy achenes. It has an agreeable, acidulous taste. The fruit of the field rose, *R. arvensis*, Huds., resembles that of the dog rose, but is nearly globular, and the styles of the achenes protrude in the form of a

column. No other wild English rose occurs in sufficient abundance to furnish an appreciable quantity of fruit.

The fruits of *R. canina* contain malic and citric acids, sugar, and a trace of tannin.

Hips are used in the preparation of confection of hips (see *Confectio Rosæ Caninæ*).

### ROSÆ CENTIFOLIÆ PETALA

#### PALE ROSE PETALS.

Pale-rose petals are obtained from the cabbage rose, *Rosa centifolia*, Linn. (N.O. Rosaceæ), a shrub universally cultivated as a garden plant. The plant grows from 1 to 2 metres in height; it has prickly stems and imparipinnate leaves, consisting of two or three pairs of leaflets, closely attached to the common footstalk, which is rough, but without spines. The leaflets are broad, ovate, serrate, pointed, and hairy on the under surface.

The petals are numerous, pale red or pink in colour, and fragrant. They should be collected when the flower is fully expanded.

Pale rose petals contain a small quantity of volatile oil and a trace of a bitter principle, to which slightly purgative properties have been attributed.

### ROSÆ GALLICÆ PETALA.

#### RED ROSE PETALS.

*Synonyms.*—*Rosa Gallica*; Red Rose.

Red rose petals are obtained from the red or Provins rose. *Rosa gallica*, Linn. (N.O. Rosaceæ), which is cultivated generally throughout Europe. The unexpanded petals are plucked as a whole from the calyx, and the lighter-coloured basal portions cut off. They are used both fresh and dried; in the latter case being gently sifted to remove any stamens.

The petals generally occur in little conical masses, easily separated into the individual petals, which are obcordate in shape, velvety, and of a deep purplish-red colour. They possess a delicate, rose-like aroma, and a slightly astringent taste. The petals yield about 4 per cent. of ash.

The colour of the drug appears to be due to an amorphous, deep red substance, soluble in water and in alcohol. It also contains a yellow, crystalline body, similar to but not identical with quercitrin, together with gallic acid, and possibly quercitannic acid. The colour of an aqueous infusion, like that of the red colouring matter, is deepened by the addition of sulphuric acid, and turned green by alkalies.

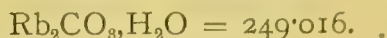
Red rose petals are mildly astringent. For this property and for their colouring matter they are used as *Infusum Rosæ Acidum*, and as *Syrupus Rosæ*. Acid infusion of roses is a convenient vehicle



for gargles containing alum or tannin; it should not be prescribed with borax or other alkaline salts. It is used also as a vehicle for quinine in mixture form. Red rose petals are further employed in the preparation of the confection and liquid extract of roses. The latter is a useful colouring agent for acid and neutral mixtures.

### RUBIDII CARBONAS.

RUBIDIUM CARBONATE.



Rubidium carbonate,  $\text{Rb}_2\text{CO}_3, \text{H}_2\text{O}$ , may be prepared by precipitating an aqueous solution of rubidium sulphate with baryta water, filtering, adding ammonium carbonate to the filtrate, and evaporating to dryness. The residue is exhausted with water, and the solution thus obtained evaporated, leaving the carbonate as a crust of an indistinctly crystalline nature.

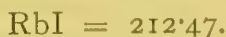
It occurs as a white, indistinctly crystalline powder, which is deliquescent and strongly caustic. Soluble in water, forming a strongly alkaline solution; only slightly soluble in hot or cold alcohol. It deliquesces in the air, yielding the hydrogen carbonate,  $\text{RbHCO}_3$ , in glassy, prismatic crystals, which are permanent, and have a very faint alkaline reaction. The salt is easily converted by heat into the neutral carbonate again. The carbonate, on being heated, loses its water of crystallisation, leaving the anhydrous carbonate as a sandy powder or porous mass which, at a higher temperature (about  $837^\circ$ ), melts without losing carbon dioxide, and forms a crystalline mass on cooling. At a still higher temperature it volatilises. The fused mass is deliquescent, and dissolves in water with elevation of temperature, forming a very caustic solution—the alkaline reaction being so strongly marked as to be still discernible at 1 in 5000.

The salts of rubidium closely resemble those of potassium in their physiological action. The carbonate may be used as an antacid in very dilute solution, but it is rarely employed in medicine.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### RUBIDII IODIDUM.

RUBIDIUM IODIDE.



Rubidium iodide,  $\text{RbI}$ , may be prepared by double decomposition between solutions of barium iodide and rubidium sulphate; or by saturating an aqueous solution of hydriodic acid with rubidium carbonate, evaporating and crystallising from water.

It occurs in the form of lustrous, white, octahedral crystals, or as a granular, crystalline powder, odourless, and having a slightly bitter, saline taste; permanent in air. Very soluble in water (about 1 in 1). Melting-point about  $642^\circ$ .

This salt is employed for the same purposes as potassium iodide; it is said to be better borne and to be less irritating to the stomach. It is best dispensed in solution.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

## RUTÆ HERBA.

### RUE.

Rue consists of the fresh and dried herb, *Ruta graveolens*, Linn. (N.O. Rutaceæ), an undershrub indigenous to Southern Europe, but commonly cultivated in Britain.

The stem is woody in the lower part only. Leaves alternate, exstipulate, bluish-green, mostly bipinnate or tripinnate, with more or less spathulate segments, and exhibiting numerous oil-glands when examined by transmitted light. Flowers greenish-yellow, with four or five concave, dotted petals, eight or ten stamens, and conspicuous disc. Odour strong and disagreeable; taste bitter and nauseous. It should be gathered before it flowers.

The drug contains about 0·06 per cent. of volatile oil, which is contained in glands distributed over the entire plant. It also contains a yellow, crystalline body, rutin (rutic acid, sophorin, phytomelin, melin), which is closely allied to quercitrin, and yields, on hydrolysis with dilute acids, quercetin, glucose, and isodulcite.

The properties of rue are virtually those of the volatile oil; it is occasionally given on sugar as a carminative and antispasmodic in hysteria, and flatulence. The herb is sometimes employed in the form of infusion as an emmenagogue.

*Dose*.—1 to 2 grammes (15 to 30 grains).

## SABINA.

### SAVIN.

*Synonym*.—*Sabina Cacumina*.

Savin consists of the young shoots of *Juniperus Sabina*, Linn. (N.O. Coniferæ), a small evergreen shrub indigenous to Southern Europe, but cultivated in England.

The leaves of savin are opposite, alternate, and each provided with a large, depressed, dorsal oil-gland. On the younger twigs they are small (2 millimetres), rhomboid, appressed, and often adnate to the stem; the older twigs (and sometimes also the young) bear longer, subulate, spreading leaves. Fruits small, baccate, drooping. Odour when crushed strong and characteristic; taste bitter, unpleasant, acrid.

The drug contains about 4 per cent. of volatile oil, together with tannin and resin.

The properties of savin are those of its volatile oil. Internally it is a powerful gastro-intestinal irritant, causing in large doses gastro-enteritis, hæmaturia, and congestion of the pelvic organs. It is

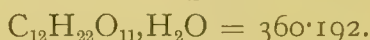
employed in small doses as an emmenagogue, acting reflexly by its irritation during excretion, but it must be given with caution. The volatile oil is given on sugar, the tincture in mixture form. Externally, savin ointment was formerly employed as an irritant to promote discharge from ulcers and blisters.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

NOTES.—*Juniperus phœnicea*, Linn., which is often substituted in France for *J. Sabina*, may be distinguished by the spiral arrangement of the leaves; the latter also contain large sclerenchymatous cells, which are not found in those of *J. Sabina*. It yields an oil which may be distinguished from that of *J. Sabina* by its lower dextro-rotation ( $+4^{\circ}$  against  $+42^{\circ}$  to  $+68^{\circ}$ ), lower total sabinol content (17 against 48 to 51 per cent.), and lower ester content (9 against 36 to 47 per cent.).

## SACCHARUM LACTIS.

MILK SUGAR.



*Synonyms.*—Sugar of Milk; Lactose; Lactobiose.

Milk sugar,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}, \text{H}_2\text{O}$ , is a peculiar, crystalline sugar obtained from the whey of milk by gently evaporating to a low bulk, and setting aside for a day or two, when the sugar crystallises out as a yellow, granular mass, and is subsequently purified by treatment with animal charcoal, and repeated crystallisation.

It occurs in hard, crystalline masses, or as a white or greyish-white, non-hygroscopic powder, gritty, odourless, and having a faintly sweet taste. Soluble in water (1 in 6), in boiling water (1 in 1), insoluble in alcohol, ether, or chloroform. Its aqueous solution is neutral to litmus, and is dextro-rotatory. When heated to  $130^{\circ}$  it loses its water of crystallisation without melting, and leaves a white hygroscopic mass. Dilute acids convert it into galactose and dextrose. It becomes brown on heating with alkalis, and reduces Fehling's solution. Sprinkled on the surface of concentrated sulphuric acid a greenish or reddish colouration may appear, but there should be no brown or brownish-black colouration (absence of cane sugar). On incineration with free access of air not more than 0.25 per cent. of ash should remain. Its aqueous solution acidified with hydrochloric acid should not respond to any of the tests for the heavy metals; nor when boiled in water and the solution cooled should it give any reaction for starch with iodine. One gramme dissolved in 10 mls of water gives a red colour with solution of phenol-phthalein after the addition of 15 centimils of the volumetric solution of sodium hydroxide (limit of lactic acid).

Milk sugar is a valuable nutrient, especially when there is extreme irritability of the stomach. It is less sweet than cane sugar and is less liable to ferment. It is largely employed in the humanisation of cow's milk for the use of young infants. Undiluted fresh cow's milk contains about 4.5 per cent. of milk sugar, whilst normal human milk approximates to 6.5 per cent. When cow's milk is diluted with water to reduce the casein content, milk sugar is added to bring up

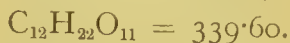


the strength to 6·5 per cent. of the whole. Milk sugar is slightly laxative and diuretic. It is employed in pharmacy as a diluent of powerful drugs to attain equal distribution of the dose. It is used as an absorbent in the preparation of some extracts, but though less prone to absorb moisture than cane sugar, it is not so suitable for this purpose as an inert vegetable powder. It is an excellent diluent for grey powder and calomel, and is preferable to powdered cane sugar for this purpose.

NOTES. —The occasional presence of magnesium or calcium salts in commercial milk sugar is apparently due to the addition of magnesia or lime to the whey during the process of crystallisation, in order to neutralise the acid used to curdle the milk. The presence of those salts is objectionable, because they induce or assist coagulation of milk to which the sugar may be added in preparing food for infants. More than traces of lactic acid must also be avoided for the same reason.

## SACCHARUM PURIFICATUM.

REFINED SUGAR.



*Synonyms.*—Saccharum ; Sugar ; Sucrose ; Saccharose.

Refined sugar, or saccharose,  $C_{12}H_{22}O_{11}$ , is officially directed to be prepared from the juice of sugar cane, but it occurs in the juice of many other plants, notably in that of beetroot, from which much of the sugar of commerce is prepared.

It occurs in white, dry, hard, odourless crystals—monoclinic prisms—with a pure sweet taste. Soluble in cold water (about 1 in 0·45), forming a syrup, very soluble in boiling water, in alcohol (1 in 100), insoluble in ether, chloroform, or carbon bisulphide. The aqueous solution is clear, neutral to litmus, and is dextro-rotatory. Boiled with dilute acids it is “inverted,” and the solution then becomes lævo-rotatory. The syrup heated to about 82° with Fehling’s solution should give not more than a trace of red or yellowish precipitate. Nor should an aqueous solution boiled with ammoniacal silver nitrate yield more than a slight colouration (absence of glucose). It should be free from calcium, chlorides, and sulphates. At 160° it fuses, and does not crystallise on cooling; at a higher temperature it becomes black, froths, and tastes bitter. On ignition it should leave no appreciable residue.

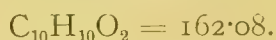
Sugar is an extremely valuable food stuff; it is employed in medicine chiefly as a sweetening agent, and as a demulcent and preservative. Weak solutions of sugar are prone to ferment, but saturated solutions may be preserved indefinitely, the osmotic conditions preventing the growth of low organisms. Sugar prevents the oxidation of substances prone to undergo this change; thus it is a good preservative of ferrous salts in the solid form or in solution. Solutions of sugar dissolve calcium hydrate freely, forming a calcium saccharate as in *Liquor Calcis Saccharatus*. The syrups are used as flavouring agents and as permanent solutions of active medicinal substances. In large quantities sugar irritates the stomach and

bowels and exerts a mild aperient action. For diluting alkaloids and other powerful drugs, and as a sweetening agent in powders, sugar of milk is preferred, as it is less prone to absorb moisture. Cane sugar may be employed in nutrient enemata (15 per cent.), but pure dextrose is usually preferred, as it is more readily absorbed. The use of sugar in large quantities is recommended in such wasting diseases as phthisis and cancer.

NOTE.—For pharmaceutical purposes, only the finest quality of cane sugar should be employed, and it should be free from all colouring matter.

### SAFROLUM.

#### SAFROL.



Safrol,  $\text{C}_6\text{H}_3\text{C}_3\text{H}_5(\text{OOCH}_2)$ , is the methylene ether of an allyl pyrocatechin. It is the chief constituent of oil of sassafras, in which it exists to the extent of about 80 per cent.; it also occurs in other volatile oils, but commercially it is almost entirely got from oil of camphor by fractional distillation, collecting the fraction boiling at about  $230^\circ$ , and purifying by repeated refrigeration and crystallisation.

It occurs, at ordinary temperatures, as a colourless or faintly yellow liquid, having a characteristic and pleasant sassafras-like odour and a sharp taste; neutral reaction; optically inactive. Soluble in alcohol (about 1 in 1), in alcohol of 70 per cent. (about 1 in 30), in all proportions of ether and chloroform. On cooling to  $-20^\circ$  it solidifies to a mass of crystals, which melt at  $12^\circ$ . It crystallises in well-defined, colourless, monoclinic crystals, having a specific gravity of 1.108; it boils at  $233^\circ$ , and may be heated to  $280^\circ$  without decomposition. Heated with alcoholic solution of potassium hydroxide isosafrol is formed, a body less toxic than safrol, and boiling at  $246^\circ$  to  $248^\circ$ . Both bodies dissolve in concentrated sulphuric acid with an intense red colouration. Safrol resists reduction with sodium, but isosafrol is readily reduced to dihydro-safrol,  $\text{C}_{10}\text{H}_{12}\text{O}_2$ . On oxidation with chromic acid mixture, safrol yields piperonal, or heliotropin, and piperonylic acid, on which account it is of great commercial value. Careful oxidation with potassium permanganate first converts it into glycol and on further oxidation into homopiperonylic acid. When administered internally safrol is eliminated from the system principally as piperonylic acid.

Safrol is employed in perfumery, and mixed with 2 or 3 parts of camphorated oil as a liniment in chronic rheumatism. It is given internally on sugar, in place of oil of sassafras.

Dose.—1 to 5 decimils (2 to 8 minims).

### SAGAPENUM.

#### SAGAPENUM.

Sagapenum is a gum-resin obtained from a species of *Ferula*, said by some authorities to be *Ferula Persica*, Willd., and by others

*F. Szoritsiana*, DC. (N.O. Umbelliferæ), growing in Arabia and Persia. It is imported in varying quantities into India by the Persian Gulf and coasts of Arabia, generally arriving in masses of 4 to 10 pounds in weight and tied up in coarse cloth, but occasionally parcels of fine, separate tears are to be seen; most of it, however, comes to London.

It occurs in yellow or yellowish-red, agglomerated granules, semi-transparent, resembling galbanum, but having a darker colour. When fresh some of the tears have a greenish tinge and are more or less opaque; but on keeping they become brownish-yellow and translucent. The odour is alliaceous, somewhat similar to but less disagreeable than that of asafœtida, and more powerful than that of galbanum, becoming more pronounced on heating. The taste is bitter and acrid. On breaking a tear the fracture does not appear pink as in the case of asafœtida. It softens with the heat of the hand, but does not completely melt at a higher temperature. On dry distillation it yields umbelliferone, and on fusion with potassium hydroxide resorcin. It is only partially soluble in alcohol and in ether, and the ethereal solution is not clouded by the addition of alcohol. Ferric chloride colours its solutions black. The volatile oil is very fluid, lighter than water, pale yellow, and has the characteristic odour of the gum-resin.

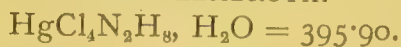
It contains from 50 to 60 per cent. of resin, 23 to 30 per cent. of gum, 3 to 11 per cent. of volatile oil containing sulphur, and 1 to 4 per cent. of bassorin, together with calcium malate and phosphate, and small amounts of sulphur and impurities; the resin contains saguesino-tannol and umbelliferone. Although it resembles galbanum in many ways it may be distinguished by its solubility in petroleum spirit, sagapenum yielding a much larger amount of resin than galbanum; the volatile oil also contains sulphur, that of galbanum being free from it. A mixture of galbanum and asafœtida is sometimes sold as sagapenum.

Sagapenum has been employed similarly to asafœtida and galbanum in amenorrhœa, hysteria, etc., but it is now rarely used.

*Dose*.—6 to 20 decigrams (10 to 30 grains).

## SAL ALEMBROTH.

SAL ALEMBROTH.



*Synonyms*.—Mercuric - ammonium Chloride; Ammonio - mercuric Chloride; Sel de Sagesse; Sel de Science; Salt of Wisdom.

Sal alembroth,  $\text{HgCl}_2(\text{NH}_4\text{Cl})_2, \text{H}_2\text{O}$ , is a double chloride of mercury and ammonium, and may be prepared by mixing hot, strong solutions of mercuric chloride and ammonium chloride in the proportion of 268.86 of the former, 106.22 of the latter, and evaporating the solution to crystallisation. The salt contains 68.41 per cent. of



mercuric chloride, 27·03 per cent. of ammonium chloride, and 4·55 per cent. of water of crystallisation.

It occurs in the form of colourless, rhombic prisms, or tabular crystals. Soluble in water (2 in 1), in alcohol (1 in 3½), in glycerin (1 in 1). The aqueous solution is neutral to litmus paper (difference from mercuric chloride). It becomes opaque at a temperature of 40°, and anhydrous at 100°; it also loses its water on exposure to dry air; at high temperatures it is volatilised with partial decomposition, and without leaving any residue. With sodium or potassium hydroxide, a white precipitate is produced in the aqueous solution.

Sal alembroth is a powerful antiseptic. Three parts of sal alembroth are approximately equal to 2 parts of corrosive sublimate. The double salt combines with albumin less readily than mercuric chloride, and is therefore less irritating to the tissues and more penetrating in its action. Sal alembroth is largely employed in the preparation of antiseptic gauze, wool, lint, etc. It has the advantage over mercuric chloride that it is not reduced by the material of the fabric, but retains its antiseptic properties for a considerable length of time. Sal alembroth dressings are coloured blue, and are often known as "blue" wool, gauze, etc. Sal alembroth has been recommended for use by intramuscular injection in syphilis; solutions for this purpose are prepared to contain 20 milligrams ( $\frac{1}{3}$  grain) in 6 decimils (10 minims).

*Dose.*—20 milligrams ( $\frac{1}{3}$  grain), hypodermically, dissolved in 6 decimils (10 minims) of water.

### SAL APERIENS.

#### APERIENT SALT.

*Synonym.*—Harrogate Salts.

Acid Potassium Tartrate	...	...	...	15·00
Sulphurated Potash	...	...	...	3·00
Magnesium Sulphate, exsiccated	...	...	...	82·00

Powder and mix the ingredients.

This preparation is a favourite purgative in gout, rheumatism, etc.

*Dose.*—4 to 8 grammes (60 to 120 grains).

### SAL PEPSINÆ.

#### PEPSIN SALT.

*Synonym.*—Digestive Salt.

Pepsin	...	...	...	...	...	3·00
Sodium Chloride, dried, sufficient to produce						100·00

Mix the pepsin with the salt, and transfer the mixture to well-closed vessels.

This preparation is used in place of ordinary table salt, as an aid to digestion.

**SALICINUM.****SALICIN.**

Salicin,  $\text{C}_6\text{H}_{11}\text{O}_5\text{OC}_6\text{H}_4\text{CH}_2\text{OH}$ , is a crystalline glucoside, obtained from the bark of various species of *Salix* and of *Populus*; a large quantity is obtained from the bark of *Salix fragilis*, Linn., or from the bark of *S. purpurea*, Linn. It may be extracted by treating a strong decoction of the bark with lead oxide, then adding sulphuric acid and barium sulphide, filtering, evaporating to a syrupy consistency, and setting the liquid aside for a time; on standing the salicin crystallises out, and may be purified by recrystallisation.

It occurs in colourless, shining, trimetric tabular crystals, or as a white, crystalline powder, odourless, but very bitter. Soluble in water (1 in 28), in alcohol (1 in 60), insoluble in ether. Melting-point,  $201^\circ$ . Its aqueous solution is neutral to litmus and is lævogyrate. It yields a red colouration with strong sulphuric acid, which disappears on the addition of water, a dark red powder being thrown down. Heated cautiously in a test-tube the odour of meadow-sweet is detected, owing to the formation of salicylic aldehyde; the latter is also formed when salicin is heated with potassium bichromate and diluted sulphuric acid. Heated in a test-tube until it turns brown, a few mls of water added, and then a drop of solution of ferric chloride, a violet colour is produced, due to the formation of saligenin. Boiled with dilute hydrochloric or sulphuric acid it is hydrolysed, yielding saliretin and dextrose. Emulsin hydrolyses the glucoside to saligenin and dextrose. An aqueous solution of salicin is not precipitated by tannic acid or potassio-mercuric iodide (distinction from alkaloids). No residue should remain on ignition (absence of mineral matter).

Salicin is partially decomposed in the stomach and intestines; it is converted into salicyl alcohol, and this is subsequently oxidised in the body into salicylic acid. The glucoside is less irritant to the mucous membranes than the salicylates, and is less certain in its action. It is in part excreted unchanged in the urine, and partly as salicyl alcohol, salicylic acid, and salicyluric acid. The action of salicin is virtually that of salicylic acid. Given in solution, it is a bitter, increasing the flow of saliva and improving the appetite. It is used as a specific in acute rheumatism, for which purpose it is less depressing than salicylic acid, and its action is more prolonged. It is also employed in influenza, ague, and malarial fevers. Salicin has been used successfully in some chronic skin diseases, especially in cases of psoriasis. It is best given in solution in mixture form, but it may also be administered in cachets, or in pills massed with glycerin of tragacanth, or in the form of Salicinum Effervesens. The bitter taste of salicin is well covered by liquid extract of liquorice.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

**SALICINUM EFFERVESCENS.**

## EFFERVESCENT SALICIN.

Salicin	...	...	...	...	...	8.00
Sodium Bicarbonate, in powder	...	...	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	...	...	24.00
Citric Acid, in powder	...	...	...	...	...	16.00
Refined Sugar, in powder	...	...	...	...	...	16.00

Mix and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The product should weigh about 100.

*Dose*.—4 to 8 grammes (60 to 120 grains).

**SALICIS CORTEX.**

## WILLOW BARK.

Willow bark is obtained from *Salix alba*, Linn. (N.O. Salicineæ), and other species of *Salix*, trees indigenous to Central and Southern Europe.

The bark is generally met with in commerce in thin, channelled pieces about 1 to 2 centimetres wide, the outer surface smooth or slightly longitudinally wrinkled (in older barks rugged), the inner striated, fibrous, and pale reddish in colour. The transverse section exhibits under the lens numerous minute, tangentially arranged groups of bast fibres, and under the microscope a thin cork consisting of two or three rows of cells with strongly thickened outer walls. Odour slight, taste astringent and slightly bitter.

Commercial willow bark contains tannin (up to 13 per cent.) as its chief constituent; it also contains salicin, but usually in small proportion only.

Willow bark is employed as a bitter and astringent.

NOTES.—Commercial willow bark, although generally referred to *S. alba*, is often the bark of some other species, as indicated by its anatomical characters. Salicin is usually prepared from the bark of *S. fragilis*, Linn., which is largely grown in Belgium, and yields the bark known as "rood scorce," which contains about 3 per cent. of salicin.

**SALICIS NIGRÆ CORTEX.**

## BLACK WILLOW BARK.

*Synonym*.—Pussy Willow Bark.

Black willow bark is obtained from the black willow, *Salix discolor* (N.O. Salicineæ), a tree 15 to 25 feet high, common in the States of North America.

The bark occurs in long, thin, tough, fibrous strips, covered externally with a thin, brownish or greenish-brown, wrinkled cork; the inner surface is pale reddish-brown in colour. It has a bitter, astringent, and somewhat aromatic taste.

This variety of willow bark contains from 3.3 to 4.3 per cent. of tannin, and about 1 per cent. of salinigrin, a white crystalline substance, soluble in water (1 in 52), and in alcohol (1 in 218); melting-



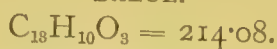
point,  $195^{\circ}$ ; rotation,  $-87.3^{\circ}$ . On hydrolysis it yields d-glucose and m-oxybenzaldehyde. It may readily be distinguished from salicin by yielding a colourless solution with sulphuric acid, salicin under these conditions producing a blood-red colour.

Black willow bark has been prescribed in gonorrhœa, and to relieve ovarian pain. A liquid extract is prepared and is used in mixture form with other sexual sedatives.

NOTE.—The bark of *Salix nigra*, Marsh., is darker, thicker and less bitter than that of *S. discolor*.

## SALOL.

SALOL.



*Synonyms.*—Phenylis Salicylas; Phenyl Salicylate.

Salol,  $\text{C}_6\text{H}_4(\text{OH})\text{COOC}_6\text{H}_5$ , is the phenyl ester of salicylic acid, and may be prepared by treating a mixture of sodium salicylate and sodium phenate in molecular proportions with phosphoryl chloride, or by passing a current of phosgene gas (carbonyl chloride) into a warmed, intimate mixture of the two salts. The product, in either case, is freed from secondary substances by washing with water until practically free from chlorides, then treated with hot alcohol and animal charcoal, filtered and recrystallised. The salt contains about 43 per cent. of phenol.

It occurs in the form of colourless, translucent, needle-shaped crystals, or as a white, microcrystalline powder, having a very faint aromatic odour, recalling wintergreen; almost tasteless. Insoluble in cold water, soluble in alcohol (1 in 12), very soluble in boiling alcohol, in ether (2 in 1), in chloroform (3 in 1), in liquid paraffin (1 in 10), in almond oil (1 in 4), in benzene, turpentine, balsam of copaiba, sandal wood oil, fixed and volatile oils; very slightly soluble in glycerin. An alcoholic solution forms with water a kind of emulsion, due to suspension of the salt in a very finely divided state. Melting-point,  $42^{\circ}$ ; the presence of a very small quantity of moisture, however, considerably lowers this figure. On ignition it burns without leaving any residue. The alcoholic solution is neutral to litmus paper, and gives a violet colouration on addition of a few drops of diluted solution of ferric chloride; with solution of bromine a white precipitate is formed. Melted with sodium hydroxide and then acidulated with hydrochloric acid, a white precipitate of salicylic acid is produced and an odour of phenol evolved. Water shaken with salol should not yield a violet colouration with solution of ferric chloride (absence of free salicylic acid), nor should it give any reaction with the tests for chlorides or sulphates.

Salol, when administered internally, is split up by the alkaline secretion of the small intestine into salicylic acid and phenol, both these bodies being excreted by the urine, which assumes a very dark colour. The effects of salol are due to the products of its

decomposition. It is given mostly for its salicylic acid content, but the phenol produced is the cause of the poisoning that sometimes occurs, and its action should, therefore, not be overlooked. Salol is used principally as an intestinal antiseptic, its insolubility rendering it suitable for this purpose. Doubt has, however, been expressed as to whether it exerts much antiseptic action in the intestine, as, measured by the amount of indican in the urine, intestinal putrefaction appears not to be diminished by its administration. It is given in cholera, typhoid fever, tuberculous ulceration of the intestine, and in putrefactive fermentations. It is a valuable urinary antiseptic, owing to the phenol and salicylic acid excreted. Salol is employed as a substitute for the alkali salicylates in acute and chronic rheumatism. It is of no value as an antiseptic for external use. Salol may be given in cachets, or suspended in milk, or in mixtures with compound tragacanth powder. It should not be prescribed in tablets or pills, as these frequently pass through the alimentary tract undissolved, and have been known to accumulate and form intestinal calculi. An emulsion of salol may be prepared by dissolving it in almond oil and emulsifying with acacia. An ether-alcohol solution of salol is used as a coating for pills, to render them insoluble in the stomach (see *Solutio Salolis Æthereæ*). A solution of salol in alcohol, flavoured with peppermint and anise oils, is used as a mouth wash (see *Liquor Salolis Compositus*). A mixture of 3 of salol and 2 of camphor forms, when heated, a viscid liquid (*Salol Camphor*), which has been used as an antiseptic application to boils and carbuncles.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

## SAMBUCI FLORES.

### ELDER FLOWERS.

Elder flowers are obtained from the common elder, *Sambucus nigra*, Linn. (N.O. Caprifoliaceæ). The flowers are borne in large cymose inflorescences, which are collected and thrown into heaps; after a few hours the corollas become loosened and can then be removed by sifting. They are either used in the fresh state, or preserved for future use (pickled) by the addition of 10 per cent. of common salt; occasionally also they are dried.

The "flowers" consist of the small, white, rotate, five-lobed monopetalous corollas, in the short tube of which five stamens with short filaments and yellow anthers are inserted; a few pedicels and immature fruits are also present. When fresh, the flowers have a slightly bitter taste and an odour that is scarcely pleasant; the pickled flowers, however, gradually acquire an agreeable fragrance, and are therefore generally used for the preparation of elder-flower water; a similar change also takes place in the water distilled from the fresh flowers.

The most important constituent of elder flowers is a trace of

volatile oil, which is of buttery consistence at ordinary temperatures and appears to contain a terpene and a paraffin.

Elder flowers are used in the preparation of Aqua Sambuci, which is employed in making lotions and collyria.

NOTES.—The leaves and bark of *Sambucus nigra* contain an alkaloid, sambucine, a purgative resin, and a cyanogenetic glucoside, sambunigrin, analogous to amygdalin. The flowers of *S. Ebulus*, Linn., a comparatively rare plant, are distinguished by their dark red anthers.

## SAMBUCI FOLIA.

### ELDER LEAVES.

Elder leaves are obtained from the common elder, *Sambucus nigra*, Linn. (N.O. Caprifoliaceæ), a small tree widely distributed in Britain.

The leaves are imparipinnate, with usually two or three pairs of very shortstalked leaflets; the latter are from 3 to 8 centimetres long, oval to lanceolate in outline, acuminate, finely and closely serrate and glabrous; upper surface dark green, paler beneath.

They contain a cyanogenetic glucoside, sambunigrin, which is allied to amygdalin; it crystallises in white felted needles. Sambunigrin is readily hydrolysed by emulsin, which is also present in the leaves, with production of hydrocyanic acid, benzaldehyde, and glucose; by the action of small quantities of barium hydroxide it is converted into prulaurasin. The fresh leaves yield about 0·16 per cent. of hydrocyanic acid. The drug also contains saccharose, invertin, and a considerable quantity of potassium nitrate.

Elder leaves are used in the preparation of Unguentum Sambuci Viride, a domestic remedy for bruises, for use as an emollient, and for application to wounds.

## SANDARACA.

### SANDARAC.

#### *Synonym.*—Gum Juniper.

Sandarac is a resin obtained by incision from the stem of *Callitris quadrivalvis*, Ventenat (N.O. Coniferæ), a small tree growing on the mountains of North-Western Africa.

The resin occurs in pale yellow, brittle tears, about 5 to 15 millimetres long, usually of cylindrical or stalactitic form, and sometimes united into small masses. The fractured surface is clear and vitreous; when chewed the resin breaks up readily into a sandy powder, which does not agglomerate into a plastic mass. It has a slight terebinthinate odour and taste. Specific gravity about 1·07; melting-point about 135°. Completely soluble in alcohol and ether, partially soluble in chloroform, carbon bisulphide, and oil of turpentine.

The resin of which sandarac chiefly consists is associated with about 1 per cent. of volatile oil, the chief constituent of which appears to be pinene. The resin is composed of crystalline, inactive pimaric



acid (sandaraco-pimaric acid), sandaracinolic acid, amorphous callitrolic acid (about 10 per cent.), and traces of other resin acids, together with a little sandaraco-resene. Callitrolic acid is easily converted into the lactone, which is insoluble in alcohol. The acid number obtained by adding excess of alkali and titrating back varies from 130 to 160, the saponification number almost nil; these characters, however, appear to vary a little with the age of the resin. The resin should leave only traces of ash when incinerated.

Sandarac is employed in alcoholic solution (2 parts and 1) on wool as a temporary stopping for teeth. In alcoholic or ethereal solution (1 part and 1) it is much employed as a pill-coating; the pills should be shaken in a china pot with a few drops of the solution and thrown on a plate to dry separately. Ethereal solutions dry very rapidly, but alcoholic solutions give the best coating.

NOTES.—Australian sandarac, from *Callitris robusta*, R. Br., is occasionally exported, but most of it is used in Australia. It closely resembles the genuine, but is often a little softer. From 5 to 22 per cent. dissolves in petroleum spirit. It contains the same constituents as the African, but a larger proportion of inactive pimmaric acid and pinene. Factitious sandarac made from colophony has an acid number about 175, and is almost entirely soluble in petroleum spirit, which dissolves but little from sandarac,

## SANGUINARIÆ RHIZOMA.

### SANGUINARIA RHIZOME.

*Synonyms.*—Sanguinaria; Blood Root.

Sanguinaria rhizome is obtained from *Sanguinaria canadensis*, Linn. (N.O. Papaveraceæ), an herbaceous plant with perennial rhizome, widely distributed throughout the United States and Canada.

The rhizome occurs in pieces from 2 to 5 centimetres long and 5 to 15 millimetres thick, dark grey or dark reddish-brown in colour, and nearly cylindrical or sometimes flattened in shape. It occasionally bears one or two short branches, but is usually deprived of the thin wiry roots. Fracture short, the section varying in colour from almost white to deep reddish-black; in most rhizomes it is red, and exhibits under the lens minute, deep red, secretion cells. Odour slight; taste unpleasantly bitter and acrid.

The chief constituents of the drug are the alkaloids sanguinarine, chelerythrine, protopine, and  $\beta$ -homochelidonine. Sanguinarine,  $C_{20}H_{15}NO_4, \frac{1}{2}H_2O$ , forms colourless crystals (melting-point,  $211^\circ$ ), but yields with acids deep red crystalline salts. Chelerythrine,  $C_{21}H_{17}NO_4, \frac{1}{2}H_2O$ , melting-point,  $203^\circ$ , is also colourless and crystalline, but forms yellow salts. Protopine,  $C_{20}H_{19}NO_5$ , also found in opium, is one of the most widely diffused of the opium alkaloids. In addition to the alkaloids bloodroot also contains a red resin.

Sanguinarine belongs to the opium group of drugs, and has an action midway between that of codeine and thebaine. In small doses it is emetic, expectorant, and mildly narcotic, but like thebaine it

increases reflexes. The powdered rhizome is a violent irritant to the respiratory passages. It is occasionally employed as a stimulating expectorant in chronic bronchitis; the tincture is, however, more suitable for internal use.

*Dose*.—6 to 30 centigrams (1 to 5 grains).

NOTE. — A resinoid named sanguinarin is prepared and has been recommended for use in bronchitis, asthma, and as an emmenagogue in amenorrhœa, in doses of 3 to 12 centigrams ( $\frac{1}{4}$  to 2 grains),

## SANGUIS DRACONIS.

### DRAGONS' BLOOD.

Dragons' blood is a resin secreted by the fruits of *Calamus Draco*, Willd. (N.O. Palmæ), and other species, climbing palms indigenous to Sumatra. These palms bear small fruits about the size of a cherry, covered with hard, imbricated scales, which become encrusted with a red resin; this is removed by shaking the fruits in sacks, and sifting out the resin, which is then softened by warming, and made into elongated, flattened, or rounded masses, the latter sometimes weighing several pounds. The former are generally wrapped in a leaf, the latter often bear the impress of coarse matting in which they have been packed.

When of good quality dragons' blood is usually covered with a dull crimson powder. The pieces are brittle, the fractured surface being vitreous and nearly black, but thin fragments have a garnet-red colour by transmitted light. The powder is of a bright crimson colour. Melting-point about 76°. Inferior qualities are duller in colour and fracture, and often contain scales or portions of the fruits, sand, etc., easily visible even to the naked eye. It is odourless and tasteless, and breaks up when chewed to a gritty powder. The resin itself is entirely soluble in alcohol, but the commercial drug may yield as much as 40 to 50 per cent. of insoluble residue consisting of vegetable debris and mineral matter.

The soluble portion of dragons' blood consists of about 56 per cent. of a red resin (draco-resinotannol combined with benzoic and benzoyl-acetic acids), 13 per cent. of a bright yellow amorphous resene (dracoresene), and 2.5 per cent. of a white amorphous body (dracoalban). The latter may be detected in Sumatran dragons' blood by boiling 10 grammes of powdered resin in 50 mils of ether, concentrating to 30 mils and pouring into 50 mils of absolute alcohol; on standing an hour a white, flocculent precipitate of dracoalban is obtained.

Dragons' blood is sometimes used for colouring plasters, but it is much more largely used for colouring lacquers and varnishes.

NOTES.—The term dragons' blood has been applied to a number of red, resinous or astringent substances. The above description is that of the commonest commercial variety, and is best designated Sumatran dragons' blood. Socotran dragons' blood, or "Zanzibar drop," is the produce of *Dracæna Cinnabari*, Balf., which grows in Somaliland. It differs from Sumatran in being in tears, in containing no fruit scales, and in not exhaling an odour of benzoic acid when warmed. Canary dragons' blood is a resin obtained from *Dracæna Draco*, Linn.; it is not a commercial article.

**SANTONICA.****SANTONICA.**

*Synonyms.*—Semen Contra; Semen Cinæ; Worm Seeds.

Santonica consists of the dried, unexpanded flower heads of *Artemisia maritima*, var. *Stechmanniana*, Besser (N.O. Compositæ), a small plant widely distributed throughout Europe and Asia. It is collected in Turkestan.

The flower heads are minute, 2 to 3 millimetres long, greenish-yellow when fresh, becoming brown on keeping; ovoid and somewhat angular, shining and glabrous, or at most only slightly hairy. Involucral bracts, 10 to 15 in number, ovate, keeled and furnished with shining external glands. Florets minute, tubular, 3 to 6. Odour agreeable, aromatic; taste bitter, aromatic, and camphoraceous.

The chief constituent of santonica is santonin (2 to 3·5 per cent.), which rapidly diminishes in quantity after the flower heads have expanded; another constituent is artemisin,  $C_{15}H_{18}O_4$  (melting-point,  $200^\circ$ ), which is probably a lactone, and yields a carmine-red solution when boiled with solution of sodium hydroxide. The odour of santonica is due to a yellow volatile oil (2 to 3 per cent., specific gravity, 0·915 to 0·940), consisting chiefly of cineol (eucalyptol), associated with an unidentified hydrocarbon. The drug yields about 10 per cent. of ash.

Santonica is used chiefly as the source of santonin.

**SANTONINUM.****SANTONIN.**

Santonin,  $C_{15}H_{18}O_8$ , is a crystalline bitter principle prepared from santonica, the dried, unexpanded flower heads or capitula of *Artemisia maritima*, var. *Stechmanniana*, Besser. Santonin may be obtained by mixing santonica with milk of lime, converting the lime salt into a soluble sodium salt and decomposing the latter with sulphuric acid. From the acid liquid santonin crystallises on cooling. Traces of acid may be removed by washing with water to which a little ammonia has been added.

It occurs in colourless, shining, flat, rhombic prisms, without odour and almost tasteless at first, but afterwards developing a bitter taste. Sparingly soluble in cold water, more soluble in boiling water; soluble in cold alcohol (1 in 40), in boiling alcohol (1 in 3), in chloroform (1 in 4), in ether (1 in 140). The solutions are neutral to litmus and are lævogyrate. Soluble in solutions of caustic alkalis; insoluble in dilute mineral acids. Melting-point,  $170^\circ$ ; sublimes on further careful heating. Exposure to sunlight causes it to assume a yellow colour. When dissolved in alcohol this yields a yellow solution from which by concentration the santonin may be recovered in a colourless state. Alkaline solutions convert it into santonates, from which santonie acid may be obtained by shaking



with hydrochloric acid and ether. With warm, alcoholic solution of potassium hydroxide, a violet-red colour is developed. A better identification test, however, is to warm a few crystals with 2 or 3 mls of solution of ethyl nitrite and add a few drops of solution of potassium hydroxide, when a fine, rose-red colour is produced. Moistened with concentrated sulphuric acid not more than a slightly yellow colour should be developed. Boiled with water acidulated with sulphuric acid and frequently shaken, the filtrate when cold should produce no turbidity on the addition of potassio-mercuric iodide (absence of alkaloids). On ignition with free access of air no residue should remain (absence of mineral matter).

Santonin is used as a remedy for round worms. Its action appears not to be that of a direct poison to the parasites, as they are expelled alive; it probably causes the worms to migrate to the lower gut, either through some disagreeable property of the drug, or by lowering the vitality of the worm so that it no longer resists peristaltic movements. In either case the parasites are removed by the purge—usually castor oil—which is best given twelve hours after the dose of santonin. It is also used to expel thread worms, but has no action on the tape worm. Santonin is absorbed to a greater or less extent, giving rise to specific effects on the sense organs, especially the colour sense, and central nervous system. Appreciation of colour is disturbed, and illuminated objects appear to have a yellowish tinge, which is sometimes preceded by a faint blue colour. Santonin may also cause headache, nausea, and vomiting, or, in large doses, epileptiform convulsions. The absorbed santonin renders the urine an intense yellow colour, if acid, or purplish, if alkaline.

It is usually given as a powder, one dose each night for three nights, followed each morning by a dose of castor oil. It may also be suspended in mixture with compound tragacanth powder, or given as *Trochiscus Santonini*. It is often given with calomel or compound scammony powder. Suppositories of santonin (3 grains in each) are used for thread worms.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

*NOTES.*—Santonin rendered yellow by exposure to light is sometimes preferred. It is known as "yellow santonin" or "photosantonin," and has been specially recommended in tropical sprue.

## SAPO ANIMALIS.

ANIMAL SOAP.

*Synonym.*—Curd Soap.

Animal or curd soap is prepared by heating purified animal fat, consisting chiefly of stearin, with sodium hydroxide and water; on adding sodium chloride to the liquid the soap separates as a curd.

It occurs as a white or light greyish, odourless solid, which is dry to the touch, though containing about 30 per cent. of water. It becomes plastic on heating, and horny when dried in warm air,

being then readily powdered. Sparingly soluble in cold water, more soluble in boiling water (1 in  $1\frac{1}{2}$ ), partially soluble in cold alcohol, and almost entirely soluble in boiling alcohol (1 in 2). The aqueous solution becomes alkaline on heating, owing to partial hydrolysis of the soap. The alcoholic solution, however, should be neutral. If 5 grammes of the dry powdered soap be extracted with boiling alcohol, filtered while hot, and the filter thoroughly washed with more of the boiling alcohol, the filtrate should not yield a pink colouration with phenol-phthalein (test for free alkali hydroxide). The filter when washed with hot water gives a solution which should require not more than 3 mils of decinormal solution of sulphuric acid for neutralisation (limit of alkali carbonate). It should impart no greasy stain when applied to white, unglazed paper (absence of free oil and fat). The fatty acids extracted by treating a solution with excess of sulphuric acid should have a melting-point between  $45^{\circ}$  and  $50^{\circ}$ . This test is of value in identifying the fatty substance from which the soap is made. A soap made with olive oil would yield fatty acids melting at about  $25^{\circ}$ . On ignition it yields a non-deliquescent ash (absence of potash soap).

The chief constituent of animal soap is sodium stearate. Glycerin is formed as a by-product in making it, but remains in the liquid left on "salting out" the soap.

Curd soap is employed in the preparation of *Linimentum Potassii Iodidi cum Sapone*. Stearin soaps are preferred for the preparation of medicated soaps, as they are less readily soluble than olein soaps.

NOTES.—The limit of moisture (30 per cent.) officially allowed in this soap is rather high, since there is no difficulty in obtaining soaps containing only about 20 per cent. of water. Of late, soaps have been prepared with sodium silicate, and such soaps may contain as much as 50 per cent. of water.

## SAPO DURUS.

### HARD SOAP.

*Synonyms.*—Olive Oil Soap; Castile Soap.

Hard soap is prepared by heating olive oil, which consists chiefly of olein, with sodium hydroxide and water, and subsequently "salting out." In India the olive oil may be replaced by arachis oil or sesame oil.

The soap occurs as a white or greyish-white, dry, odourless solid, which softens on heating, and becomes horny when dried in warm air, being then readily powdered. Soluble in cold water (1 in 20), very soluble in hot water (1 to  $1\frac{1}{2}$ ), only slightly soluble in cold alcohol, but entirely soluble in boiling alcohol (1 in 2). It should contain neither free oil nor potash soap, and not more free alkaline hydroxide or carbonate than is officially allowed in *Sapo Animalis*. When dried at  $110^{\circ}$  it should not lose more than 30 per cent. of moisture.

The chief constituent of hard soap is sodium oleate. As in the case of *Sapo Animalis*, glycerin is formed as a by-product in making it, and remains in the liquid left on "salting out" the soap.

Hard soap is given internally as a laxative, and especially to increase the activity of other laxatives, such as aloin, scammony, jalap, and rhubarb. Large doses are reputed to assist in removing gall-stones, through its action as a solvent of cholesterin, and a pure form of sodium oleate is prepared for internal administration in pills or capsules. Hard soap is a useful pill excipient with resinous substances and volatile oils. It is an ingredient of many plasters.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

*NOTES.*—Sapo, U.S.P., is hard, olive oil soap. "Mottled" Castile soap is obtained by adding a salt of iron to the soap mass.

### SAPO KALINUS.

POTASH SOAP.

*Synonym.*—Linseed Oil Soap.

Linseed oil soap may be prepared by the following process:—Heat 40 of linseed oil to about 70° on a water-bath, dissolve 9 of potassium hydroxide in 45 of water, heat the solution to 70°, and mix thoroughly with the oil; then add 4 of alcohol, mix, and continue the heat (without stirring) until a small portion of the mixture is found to dissolve in boiling water without the separation of oily drops. Finally, allow the product to cool, and transfer it to suitable vessels.

Potash soap is used in the preparation of Spiritus Saponis Kalini, a form of liquid soap preferred by some surgeons to the preparations of soft soap for use as cleansing agents.

It occurs as a soft, unctuous, yellowish-brown mass, with a characteristic odour and an alkaline taste. Soluble in water, the aqueous solution being nearly clear and showing an alkaline reaction to litmus paper. When dissolved in hot alcohol, not more than 3 per cent. of insoluble residue should remain.

*NOTE.*—Sapo Kalinus is official in the German Pharmacopœia, and corresponds to Sapo Mollis, U.S.P.

### SAPO MOLLIS.

SOFT SOAP.

*Synonyms.*—Sapo Viridis; Green Soap.

Soft soap is prepared by heating olive oil with potassium hydroxide and water, and allowing the mixture to cool.

It occurs as a yellowish-green, sometimes yellowish-white or yellowish-brown, almost odourless, plastic, and unctuous mass, and is usually transparent. Soluble in cold water (1 in 4), yielding a clear or nearly clear solution; it is more soluble in boiling water (1 in 1), and almost entirely soluble in alcohol (1 in 1). On treatment with hot alcohol, not more than 3 per cent. of insoluble residue should remain (limit of potassium carbonate, insoluble soaps, etc.). It should contain as little free alkali hydroxide or carbonate as Sapo Animalis, and should be free from unsaponified oil. On incineration it leaves a deliquescent ash, which should consist almost entirely of potassium carbonate, and not contain copper.



Soft soap consists chiefly of potassium oleate, but also contains the glycerin formed in making it.

Soft soap is employed in the preparation of Linimentum Terebinthinæ and Linimentum Saponis, its solution in dilute alcohol forming a suitable friction for rubbing sprains and bruises. A strong solution in alcohol (2 parts in 3) is much used as a liquid shampoo to cleanse the scalp previous to the application of antiseptic lotions. Such a solution is also employed by surgeons to cleanse the skin, or an ethereal solution of soft soap may be used (see Solutio Saponis Etherea). Soft soap is used to remove incrustations in chronic, scaly, skin diseases, such as psoriasis. A solution (1 in 30 to 40 of warm water) is employed as a rectal enema to remove impacted fæces.

NOTES.—The tint of soft soap depends on that of the olive oil employed in making it, but copper compounds are sometimes added to produce an artificial green colour. Sapo Mollis, U.S.P., is prepared with linseed oil (see Sapo Kalinus).

## SAPONINUM.

### SAPONIN.

*Synonyms.*—Quillaic Acid; Quillain.

Saponin is obtained chiefly from quillaia bark, and the commercial article is a mixture obtained by boiling the powdered bark several times with water until exhausted, evaporating the decoction thus obtained to dryness, and boiling the extract with alcohol under a reflux condenser. This solution deposits the "saponin" on cooling, and the process of boiling and cooling is repeated until the product is perfectly white.

It occurs as an amorphous, white powder, having a sweetish, afterwards bitter, acrid taste, accompanied by a burning sensation; its dust is intensely irritating and sternutatory. Soluble in water and in hot alcohol, with difficulty in cold alcohol, insoluble in ether, chloroform, benzene, or carbon bisulphide. The solubility in water is increased by slight addition of alkali. An aqueous solution, even if so dilute as 1 in 1000 or less, froths like soap solution, the froth being very persistent, but dispersable by alcohol or ether. Saponin is a colloidal substance, has glucosidal properties, and is decomposed by the action of hot, diluted, mineral acids, dextrose and sapogenin resulting from the decomposition. Concentrated sulphuric acid dissolves it, the solution becoming yellow on standing, and then gradually red.

Commercial saponin contains true saponin, a glucoside to which is ascribed the formula  $C_{11}H_{30}O_{10}$ ; lactosin, a carbohydrate; quillaic acid, and sapotoxin, both of which are acrid and poisonous. Pure saponin is non-poisonous and non-sternutatory, and occurs in many plants, in several modifications, and in various parts of the plants.

Saponin is added to various liquids as a frothing agent, but is not given medicinally. It can be used to emulsify fixed oils, liquid tars, etc.; but, for such purposes, tincture of quillaia is commonly preferred.

## SAPPAN.

SAPPAN.

*Synonym.*—Sappan Wood.

Sappan consists of the heartwood of *Cæsalpinia Sappan*, Linn. (N.O. Leguminosæ), a tree indigenous to India.

The wood occurs in red, hard, heavy pieces, or in orange-red chips. It is whitish when freshly cut, but becomes red on exposure to air. A transverse section exhibits well-marked, concentric rings, numerous narrow, medullary rays, and large vessels. The drug has no odour, but an astringent taste.

The chief constituent of the wood is a colourless, crystalline principle, sapanin,  $C_{12}H_{10}O_4$ , which is closely allied to brasilin,  $C_{16}H_{14}O_5$ , obtained from brazil wood, and to hæmatoxylin (from logwood),  $C_{16}H_{14}O_6$ . Solutions of both brasilin and sapanin assume a carmine-red colour in contact with even traces of caustic alkalies, whereas solution of hæmatoxylin becomes purple. Sapanin is soluble in both alcohol and water.

Sappan is official in India and the Eastern Colonies for use in place of logwood as an astringent (see Decoctum Sappan).

## SARSÆ RADIX.

SARSAPARILLA.

Sarsaparilla is the dried root of *Smilax ornata*, Hook. f. (N.O. Smilacæ), a climbing plant growing in Costa Rica. The plant produces a stout, knotty rhizome, from which climbing, woody stems and long, slender, cylindrical roots proceed. The roots are collected, dried, and made into bundles; these are bound into bales, and exported.

The official sarsaparilla is known commercially as "Jamaica" sarsaparilla. It is imported in bundles about 45 centimetres long and 10 to 12 centimetres wide, consisting of the folded roots loosely bound by a long root of the same plant. The root is long, flexible, tough, and longitudinally furrowed, of a greyish-brown or reddish-brown colour, and bearing a number of fibrous rootlets. The transverse section, which is about 5 millimetres wide, exhibits a reddish-brown cortex and yellowish wood. The cells of the endodermis appear under the microscope to be nearly square and uniformly thickened, a character which is useful in distinguishing Jamaica from other varieties of sarsaparilla. The drug has no odour, and only a slightly bitter taste.

The chief constituents of sarsaparilla are three glucosides belonging to the sapotoxin group, viz., parillin, smilasaponin, and

sarsasaponin. Both parillin and smilasaponin have also been called smilacin, a term which is therefore best avoided. Parillin and sarsasaponin are crystalline, but smilasaponin is amorphous. The drug contains in addition varying quantities of starch. It yields from 10 to 20 per cent. of extract, and about 7 per cent. of ash.

Sarsaparilla is used in the treatment of chronic skin diseases and in syphilis. It is extremely doubtful whether it exerts any action in these conditions, and its chief use is as a vehicle for the administration of mercury and potassium iodide. It is given principally as the compound decoction or as *Extractum Sarsæ Liquidum* or *Liquor Sarsæ Compositus Concentratus*. Preparations of sarsaparilla are incompatible with alkalis.

NOTES.—The following varieties of sarsaparilla appear in commerce:—(1) Lima (also called Lima Jamaica), imported from Panama. It closely resembles the official, but the bundles are longer and the bales larger; the cells of the endodermis are oblong and strongly thickened on the outer and tangential walls; (2) Honduras; the bundles are long and narrow, tightly whipped round with a root, and packed in serons with cow-hide ends. This variety is more starchy than the Jamaica, and generally preferred on the Continent. (3) Guayaquil; the bundles are flattened, the root stout, not much furrowed, and of a mahogany brown colour. The drug generally contains the rhizome. (4) Vera Cruz or Mexican, obtained from *Smilax medica*, Schl. and Cham.; this variety is not made into bundles; the drug consists of the rhizome to which the roots are attached. It is easily recognised by the dull greyish-brown colour, the form of packing, and the unequal thickening of the endodermal cells. (5) Native Jamaica, obtained from *S. officinalis*, H.B.K., on the island of Jamaica. The drug is sent loose in large bales, and is distinguished by its colour, which is usually distinctly reddish and pale.

## SASSAFRAS MEDULLA.

### SASSAFRAS PITH.

Sassafras pith is obtained from the young stems and branches of *Sassafras officinale*, Nees and Eberm. (N.O. Laurineæ), being collected late in the autumn, after frost, and dried.

It occurs in light, whitish, more or less cylindrical, often curved or coiled, pieces, of variable length, and about 5 millimetres in diameter. The pith has a slight odour and a mucilaginous taste. When macerated in water it yields a mucilage which is not precipitated upon the addition of alcohol.

The chief constituent of sassafras pith is the mucilage, but it also contains a trace of volatile oil.

Sassafras pith has demulcent properties, and the mucilage prepared from it is used in collyria.

## SASSAFRAS RADIX.

### SASSAFRAS ROOT.

*Synonym.*—Sassafras.

Sassafras root is obtained from *Sassafras officinale*, Nees and Eberm. (N.O. Laurineæ), a tree which is widely distributed over the eastern United States.



The dried root comes into commerce in large, branched pieces, more or less covered with a dark reddish or greyish-brown spongy bark. The wood is greyish-yellow or greyish-red in colour, soft, and easily cut. Both bark and wood, but especially the former, have an agreeable, fragrant odour, and an aromatic, slightly astringent taste.

The root contains about 2 per cent. of volatile oil, while the bark alone contains from 6 to 9 per cent. It yields about 2 per cent. of ash.

Sassafras is an ingredient of compound decoction of sarsaparilla, its action being that of a mild aromatic and carminative by virtue of its volatile oil.

### SCAMMONIÆ RADIX.

#### SCAMMONY ROOT.

Scammony root is obtained from *Convolvulus Scammonia*, Linn. (N.O. Convolvulaceæ), a climbing plant indigenous to the Eastern Mediterranean.

The dried root is brownish-grey in colour, cylindrical or slightly tapering, often spirally twisted, and usually of considerable size, varying commonly from 2 to 10 centimetres in diameter; it is crowned with the short remains of numerous aerial stems. The transverse section exhibits a number of nearly circular bundles, distributed throughout a parenchymatous ground tissue. The odour is characteristic, the taste sweetish, and slightly acrid.

The root contains up to 13 per cent. (average about 8 per cent.) of resin, consisting almost entirely of scammonin; it also contains starch, sugar (15 per cent.), etc. It yields about 10 per cent. of ash. The starch of scammony root is in small grains, which are usually compound (two, three, or four constituents); the isolated, component, starch grains are conical or muller-shaped, and usually exhibit a V-shaped or radiately cleft hilum; the large grains measure about  $20\mu$  to  $25\mu$ .

Scammony root is rarely used, its properties residing in the resin (see *Scammonia Resina*).

### SCAMMONIÆ RESINA.

#### SCAMMONY RESIN.

Scammony resin is prepared by exhausting scammony root by percolation with alcohol, then recovering most of the alcohol by distillation, and precipitating the resin from the residual liquid by slowly pouring it, with constant stirring, into ten times its volume of water. After the resin had subsided, it is collected on a filter, washed with boiling, distilled water, and dried on a water-bath.

The resin, as thus obtained, occurs in brownish, translucent, brittle pieces, with a sweet, fragrant odour, and resinous fracture. It does not

form an emulsion when triturated with water (distinction from the gum-resin of scammony), is almost entirely soluble in ether (distinction from jalap resin), and its alcoholic solution does not give a blue colour with solution of ferric chloride or solution of hydrogen peroxide (absence of guaiacum resin). It consists almost entirely of the glucosidal resin, scammonin, and is identical with the ether-soluble resin of jalap root. Boiling with a diluted mineral acid converts it into scammonolic acid and glucose. It dissolves in hot solutions of caustic alkalies, and is not reprecipitated on acidifying. Acid number, 14.6; saponification number, 171.0; ester value, 185.6.

Scammony resin is a drastic purgative, resembling jalap and colocynth. Its action is rapid, but it may cause nausea and vomiting. Large doses set up acute gastro-intestinal irritation, with congestion of the pelvic organs. Absorption has been known to occur and to set up cystitis and nephritis. The action of scammony is greatly facilitated by bile, which assists solution. It is employed usually with other purgatives such as colocynth or jalap to relieve cerebral congestion by lowering blood pressure and to remove fluid in dropsical conditions. The resin is of service as an anthelmintic, and is given with calomel or santonin to remove thread worms and round worms. It is used in pill form as *Pilula Scammonii Composita*, and in powders or cachets as *Pulvis Scammonii Compositus*, and is an ingredient of the compound pill and extract of colocynth. When prescribed in pill form, an equal weight of soap should be ordered; this assists the preparation of the pill mass, promotes solution in the intestine, and enhances the purgative action of the drug.

*Dose*.—2 to 5 decigrams (3 to 8 grains).

*NOTE*.—Most of the scammony resin of commerce is obtained from the root of *Ipomœa orizabensis*, Ledanois (see Notes under Jalapa).

## SCAMMONIUM.

### SCAMMONY.

*Synonym*.—Scammony Juice.

Scammony is a gum-resin, obtained by incision from the living root of *Convolvulus Scammonia*, Linn. (N.O. Convolvulaceæ). Scammony root contains in the parenchymatous tissue superposed, elongated cells, filled with a resinous emulsion. In collecting the drug the crown of the root is cut off obliquely, and the emulsion which flows collected in a shell placed at the lower end of the cut surface. The contents of the shells are collected and added to from time to time. They are then made into cakes and allowed to dry.

The finest commercial qualities of scammony, known as virgin scammony, occur in large, flat, dark grey or blackish pieces, or irregular, flattened lumps, which are easily broken, thin fragments being translucent and yellowish-brown. The fractured surface is glossy and usually exhibits small cavities, probably produced by fermentative changes that take place during the slow drying of the

drug. The odour is cheesy, and the taste slightly acrid. Occasionally virgin scammony of a golden-brown colour and with very few cavities is met with; this is obtained by rapidly drying the collected gum-resin, but it is seldom seen in commerce.

The drug consists of resin (see *Scammoniae Resina*) and gum, the quality of the drug being determined by the amount of resin present; this being soluble in ether can be removed by that solvent and weighed. Pure virgin scammony may yield as much as 90 per cent., but commercial qualities usually vary from 75 to 85 per cent., the official limit being 70 per cent. It should not yield more than 3 per cent. of ash, and should not contain more than traces of starch.

The action of scammony resembles that of scammony resin (see *Scammoniae Resina*). It is, however, miscible with water or milk, the resin forming an emulsion with the gum present (see *Mistura Scammonii*).

*Dose*.—3 to 6 decigrams (5 to 10 grains).

*NOTES*.—Scammony is much adulterated, the chief admixtures being starch and chalk, or other inorganic matter. The latter is best determined by incineration. The official limit is often exceeded even in samples that contain more than 70 per cent. of resin. Starch may be detected by boiling a little of the drug previously emulsified, cooling, and adding iodine; traces of scammony starch are occasionally present, but foreign starches (wheat starch) should be absent. Adulteration with foreign resins may be detected by dissolving the resin extracted by ether in hot solution of potassium hydroxide. On acidifying, scammony resin is not precipitated, whereas most foreign resins are. Inferior qualities of scammony are usually hard and tough, break with a dull fracture, and are not porous. Skillep is a variety consisting of farinaceous dough mixed with some of the gum resin. Scammony may be distinguished from scammony resin by its porosity, by its characteristic odour, and by the gum present, which enables it to form an emulsion when triturated with water. Factitious mixtures of powdered resin with powdered gum acacia may also be distinguished from genuine powdered scammony by the odour, but admixtures of these with the genuine drug are not easily detected.

## SCILLA.

### SQUILL.

Squill consists of the bulb of *Urginea Scilla*, Steinh. (N.O. Liliaceæ), divested of its outer membranous scales and dried; indigenous to the Mediterranean district.

The commercial drug consists usually of transverse slices of the middle leaves of the bulb, the soft central portion being rejected together with the outer membranous scales. They are usually of a yellowish-white or pinkish colour, about 2.5 to 5 centimetres long, 1 centimetre wide and 3 millimetres thick, tapering towards either end. When quite dry they are brittle, but they rapidly absorb moisture and become tough and flexible. Odour slight, taste disagreeably bitter and acrid.

The chief constituents of squill are the toxic, amorphous glucosides scillipicrin and scillitoxin. Scillin is a crystallisable, inactive glucoside;



this name has also been applied to a carbohydrate, sinistrin, found in the drug and probably identical with tritacin and irisin (phlein). The drug also contains mucilage and calcium oxalate in bundles of large acicular crystals; the latter penetrate the skin when the bulbs are handled, and are said to be the cause of the irritation that has been observed. Squill yields about 3 per cent. of ash.

Squill resembles digitalis in its action, but its effects on the heart and blood vessels are much more powerful; it increases the force of cardiac systole to a greater extent, and its action on the systemic blood vessels raises blood pressure to an extent which is unobtainable by digitalis. It also constricts the coronary vessels much more strongly than digitalis, and this is no doubt one reason which has rendered its value second to that of digitalis in therapeutics, because it is so essential in cardiac therapeutics to do all that is possible to improve the blood supply of the heart itself. Squill is more irritant and not so readily absorbed as digitalis. In large doses it produces nausea and vomiting, and it was at one time used as an emetic. In smaller doses it mildly irritates the stomach, and produces reflex secretion from the bronchioles; it is much used as an expectorant in the treatment of cough in chronic bronchitis. The tincture is used in mixture form with other expectorants, especially ipecacuanha and ammonium carbonate. Vinegar, oxymel, and syrup of squill, are also common constituents of expectorant cough mixtures. For use as a cardiac tonic in dropsy, it is frequently given in pill form with blue pill and digitalis (see *Pilulæ Digitalis Compositæ*.)

*Dose*.—6 to 18 centigrams (1 to 3 grains).

NOTES.—There are two varieties of squill, viz., white and pink; the former is generally preferred in England, the latter in France. There is much uncertainty regarding the active constituents, and those named are not to be regarded as pure substances of definite chemical composition.

## SCOPARII CACUMINA.

### BROOM TOPS.

*Synonym*.—*Scoparius*.

Broom tops are obtained from *Cytisus Scoparius*, Link (N.O. Leguminosæ), a shrub indigenous to England and temperate Europe. The tops are used both fresh and dried.

The stem of the broom produces long, slender, glabrous, alternate branches which bear small, sessile leaves near the tips, but trifoliate, stalked ones below. The flowers are yellow and papilionaceous, the fruits flattened legumes with hairy margins. When dried the drug often consists almost entirely of the slender branches. Taste bitter and disagreeable, odour slight.

The drug contains a liquid, volatile alkaloid, sparteine, in small proportion, together with a yellow, crystalline substance, scoparin,

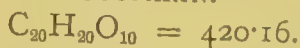
belonging to the quercetin group. It yields about 3 per cent. of ash.

Broom tops are employed as a feeble diuretic, generally in dropsical complaints of cardiac origin. This action is due to the scoparin; the sparteine present was formerly reputed to exert a tonic action on the heart; in reality, however, its action is almost identical with that of coniine. In large doses sparteine weakens the heart, depresses nerve cells, and lowers blood pressure. It has been proposed to use sparteine to paralyse the vagus before the administration of chloroform, but atropine is much more satisfactory for this purpose.

The drug is given usually in the form of decoction, often with squill and ammonium or potassium acetate.

### SCOPARINUM.

#### SCOPARIN.



Scoparin,  $\text{C}_{19}\text{H}_{16}\text{O}_8 (\text{OH}) (\text{OCH}_3)$ , is an indifferent substance (not a glucoside), occurring in broom, *Cytisus Scoparius*, Link (N.O. Leguminosæ), and may be prepared by boiling the tops and twigs of the plant in water, evaporating the decoction to a low bulk and allowing to stand for twenty-four hours. The gelatinous, crude scoparin thus obtained is washed with a little cold water, dissolved in boiling water containing a few drops of hydrochloric acid, filtered and set aside to solidify; the jelly again formed is purified by washing, pressing, and drying over a water-bath.

It occurs as a pale yellow, amorphous, brittle mass, or as a yellow, crystalline powder, tasteless, odourless, and neutral. Scarcely soluble in cold water; soluble in hot water, forming a light, greenish-yellow solution; slightly soluble in cold alcohol; soluble in hot alcohol; easily soluble in solution of ammonia and in solutions of the caustic alkalies and their carbonates. The solutions in caustic alkalies are greenish-yellow, and deposit a greenish-brown resin on boiling. Hot aqueous solutions reduce alkaline copper and silver solutions. A solution in hot alcohol yields a jelly on partial evaporation and forms crystals in the cold. The cold, ammoniacal solution is precipitated by excess of hydrochloric acid as a jelly. When slowly heated the substance puffs up and melts at about  $202^\circ$ ; if quickly heated it melts at about  $219^\circ$ ; on further heating it carbonises without subliming and burns with a bright flame. Chlorinated lime colours its aqueous solution dark green; bromine gives a bluish-green colour. By the action of nitric acid, picric acid is formed. Neutral and basic lead acetates give a yellowish-green precipitate, but silver nitrate and mercuric chloride have no action. On fusion with potassium hydroxide, phloroglucin and protocatechin are formed. Hot alcohol converts it into a jelly-like, insoluble, and a crystalline, soluble modification.

Scoparin is said to be the chief cause of the diuretic action of broom tops, and it may be given in place of the preparations of the crude drug, either in mixture form with sodium bicarbonate, or hypodermically, dissolved by the aid of a very small quantity of solution of ammonia.

*Dose*.—3 to 5 decigrams (5 to 8 grains); hypodermically, 3 to 5 centigrams ( $\frac{1}{2}$  to 1 grain).

## SECRETINUM.

### SECRETIN.

*Synonyms*.—Pansecretin; Duodenin.

Secretin is a principle which exists in the lining membrane of the duodenum and upper part of the small intestine of vertebrates. It may be extracted from the duodenal membrane of the ox, pig, or sheep, by treatment with 0.4 per cent. hydrochloric acid, as described under *Liquor Duodenalis*.

Secretin is unaltered by boiling, and is soluble in water or alcohol. Nothing is known with regard to its chemical composition, but it is supposed that the upper part of the small intestine contains its precursor prosecretin, from which, by hydrolytic action, secretin can be obtained.

The use of secretin has been suggested in cases where there is reason to suspect a deficiency of pancreatic secretion. It has also been used in diabetes, but with doubtful benefit. It is best administered in the form of *Liquor Duodenalis*, and is most active when injected hypodermically; it has also been given by the mouth, and is apparently not destroyed by the gastric juice (see also *Pulvis Duodenalis*).

## SENEGÆ RADIX.

### SENEGÆ ROOT.

*Synonym*.—Senega.

Senega root consists of the dried root and root-stock of *Polygala Senega*, Linn. (N.O. Polygalææ), a plant which is widely distributed over the United States.

The drug is greyish-brown or yellowish-brown, slender, frequently curved, and surmounted by a knotty crown, to which the remains of slender, aerial stems are attached. Most of the roots are distinctly keeled; fracture short. A transverse section exhibits a horny, translucent cortex, and a wood that is often irregularly developed, one or sometimes two, wedge-shaped portions consisting entirely of parenchymatous tissue; the cortex contains numerous minute oil globules, but no starch. The odour of senega recalls that of winter-green; taste at first sweetish, afterwards acrid. The powdered drug is very irritating when inhaled, and imparts to water the property of frothing.



The chief constituents of the root are the two glucosidal saponins, senegin and polygalic acid, which resemble but are not identical with sapotoxin and quillajic acid. The drug is said to contain other glucosides which, however, have not yet been sufficiently investigated. Polygalic acid is sternutatory and produces frothing, while senegin is decidedly toxic. The odour is due to the presence of a small quantity of methyl salicylate. The drug yields about 4 per cent. of ash.

The action of senega is attributed to its glucosidal saponins, which are irritants to the gastric mucous membrane, and give rise to a reflex secretion of mucus in the bronchioles. It is employed as a stimulating expectorant in chronic bronchitis. The drug is employed chiefly as Infusum or Decoctum Senegæ and Tinctura Senegæ, and is usually given with other expectorants, such as ipecacuanha, squill, and ammonium carbonate.

NOTES.—Several varieties of senega root occur in commerce, viz. (1) Western Senega; this is the official variety as above described. (2) Northern Senega, obtained from *P. Senega*, var. *latifolia*. It is considerably larger than Western senega, darker in colour, less contorted, and less markedly keeled, but it has a very acrid taste, and is an active drug. (3) Southern Senega, from *P. alba*, Nuttall; this is smaller and more slender than Western senega, paler in colour, with normal wood. It is much less acrid in taste, and presumably, therefore, less active, and may not be substituted for the official drug. The presence of methyl salicylate does not necessarily indicate a genuine drug, as some samples of true senega do not contain it, while others do that are not genuine. The amount present appears to increase as the drug is kept, probably due to a gradual decomposition of a glucoside in the drug.

## SENNA ALEXANDRINA.

### ALEXANDRIAN SENNA.

Alexandrian senna consists of the dried leaflets of *Cassia acutifolia*, Delile (N.O. Leguminosæ), a small shrub indigenous to the middle and upper Nile territories.

The leaves of the senna plant are paripinnate, compound, 10 to 15 centimetres long. Leaflets lanceolate or ovate-lanceolate, about 2.5 centimetres long, pale greyish-green in colour, thin and brittle, unequal at the base, and covered with a very short, fine pubescence visible under a lens; margin entire, slightly incurled, apex acute and mucronate. Epidermis of both surfaces furnished with stomata, each stoma being surrounded by two to four cells, two of which are parallel to the ostiole; epidermal cells polygonal, not papillose; hairs one-celled, conical, warty, straight or curved, sometimes slightly enlarged near the middle; pericycle fibrous, accompanied by prismatic crystals of calcium oxalate. The drug has a slight but characteristic odour, and a mucilaginous, sickly taste.

The constituents of senna leaves are not yet well known. Anthra-glucosennin is the name given to a mixture of substances obtained by exhausting senna with weak ammonia, precipitating with hydrochloric acid, drying the precipitate, exhausting with alcohol, and

evaporating to dryness. It contains senna-emodin,  $C_{15}H_7O_2(OH)_{13}$ , which appears to be identical with aloë-emodin, but different from frangula-emodin and rheum-emodin; senna-chrysophanic acid, probably not identical with ordinary chrysophanic acid; glucosennin, a glucoside yielding apparently senna-emodin and a sugar; senna-iso-emodin, which closely resembles senna-emodin, but is soluble in petroleum spirit; senna-rhamnetin and senna-nigrin, the last two being ill-defined substances. Probably, therefore, the drug originally contains senna-emodin, senna-isoemodin, senna-chrysophanic acid, and glucosides yielding these bodies by hydrolysis. The so-called cathartic acid is undoubtedly a mixture. The drug contains in addition mucilage, and leaves on incineration about 10 per cent. of ash, although picked leaves (Indian) have yielded as much as 13 per cent.

Senna is an efficient purgative either for occasional use or in habitual constipation. It is free from the after-astringent action of rhubarb, but, on account of its tendency to gripe, is usually combined with carminatives and other laxatives. Syrupus Sennæ, Confectio Sennæ, and Pulvis Glycyrrhizæ Compositus are suitable laxatives for the use of children and delicate persons, and are especially valuable in hæmorrhoids. The infusion of senna is an active preparation, and is a useful vehicle for magnesium sulphate and other saline cathartics. The urine may be turned a yellow colour by senna, which changes to red on the addition of an alkali; it is uncertain, however, whether this is due to the absorption of the irritant principle. The properties of senna preparations are altered by excessive heat and by the action of alkalies. The official Mistura Sennæ Composita retains its activity better when the aromatic spirit of ammonia is omitted.

*Dose*.—6 to 20 decigrams (10 to 30 grains).

NOTES.—Alexandrian senna leaves as now imported are practically free from admixture. Occasionally the leaflets of *C. obovata*, Collod., may be found; they are readily distinguished by their obovate shape, and in powder by the papillose cells of the lower epidermis. Arabian or Mecca senna from *C. angustifolia*, Vahl., is sometimes offered as Alexandrian; the leaves are, however, narrow, lanceolate, and the drug usually discoloured. The leaflets of *C. montana*, Heyne, are darker in colour, have a rounded apex, and dark network of veins; those of *C. holosericca*, Fresen., are small and hairy. Senna, U.S.P., is derived from both *C. acutifolia* and *C. angustifolia*.

## SENNA INDICA.

### INDIAN SENNA.

*Synonym*.—Tinnevelly Senna.

Indian senna consists of the leaflets of *C. angustifolia*, Vahl., cultivated in India.

The leaflets of Indian senna are from 2.5 to 5 centimetres long, yellowish-green in colour, lanceolate, less conspicuously asymmetrical and less pubescent than Alexandrian senna, from which they may also be distinguished by their flatness, due to their having been

packed by hydraulic pressure and by their distinctive odour. They otherwise resemble Alexandrian senna.

The constituents and uses of Indian senna are the same as those of Alexandrian senna.

## SENNÆ FRUCTUS.

### SENNÆ PODS.

*Synonym.*—Senna Legumes.

Senna pods are the dried fruits of *C. acutifolia*, Delile, and of *C. angustifolia*, Vahl.

The pods are brown or greenish-brown, broadly oblong, very flat legumes, curved and rounded at each extremity. They vary from 3 to 6 centimetres in length and from 2 to 2.5 centimetres in width, and contain several flat, obovate-cuneate seeds. Indian senna pods are usually darker and slightly narrower than the Alexandrian, and the remains of the base of the style usually more distinct.

The constituents of senna pods are apparently the same as those of senna leaves. The former are, however, considered by many practitioners to be more certain in their action and to cause less griping.

A sweetened infusion of senna pods is a valuable laxative for children, and Extractum Sennæ Leguminosum Liquidum or the corresponding elixir may be used in place of the preparations of the leaves.

## SERIPARUS.

### RENNET.

Rennet is a substance having the property of coagulating or curdling milk. It is obtained from the fourth or true digesting stomach of the calf, which is freed from superfluous matter such as outer skin, useless membrane, and fat, washed, treated with salt, and hung up to dry. When prepared as described the stomachs have a parchment-like appearance, and are known as "vells." These vary in size and in rennet value. The clotting enzyme is secreted by special glands in the stomach of all mammals, especially in that of the calf, in which it occurs abundantly. After treating the stomachs in the above way and comminuting, the rennet is extracted by means of a solution of common salt—about 5 per cent.—which is the most effective solvent.

On the addition of a small quantity of the rennet solution to sweet, unboiled milk at a temperature of about 37°, a coagulum or curd forms. This is due to casein or caseinogen, the principal proteid of milk, being altered to tyrein by the ferment. Other substances are carried down at the same time. Milk that has previously been boiled will not coagulate with rennet. The same



applies to milk that has been deprived of its lime salts by dialysis or by being made alkaline.

Coagulation, or curdling by rennet, is an entirely different action from that by acids. In the latter case the curd can be redissolved, and is found to be unchanged in constitution, whilst in the former case an insoluble curd has been formed, and the casein has been changed into tyrein. The constitution of the ferment, which is said to consist of chymosin, is still unknown. At a temperature above  $45^{\circ}$  the action of the enzyme is weakened, and at  $70^{\circ}$  it is completely destroyed. Alcohol has an inhibitive action, but only in large quantities. Glycerin, alcohol in moderate quantity, and boric acid are used as preservatives of rennet solutions. Rennet is usually found in commerce in the liquid form (see *Liquor Seriparus*), but it also occurs in the form of powder and tablets.

NOTE.—Charcoal should not be used in filtering solutions of rennet, as it appears to abstract the ferment.

## SERPENTARIÆ RHIZOMA.

SERPENTARY ROOT.

*Synonym.*—Serpentaria.

Serpentary rhizome consists of the dried rhizome and roots of *Aristolochia Serpentaria*, Linn., or of *A. reticulata*, Nutt. (N.O. Aristolochiaceæ), small herbaceous plants with perennial rhizome, indigenous to the United States, the former growing in the States east of the Mississippi and the latter in Texas and the south-western States.

The variety of serpentary now usually found in commerce is the Texan or Red River. It consists of a short, slender rhizome about 2.5 centimetres long and 3 millimetres thick, bearing along its upper surface the remains of successive, aerial stems, and on its lower surface numerous long, curved, but not matted roots. The transverse section of the rhizome exhibits an eccentric pith and curved wood-bundles. The drug has a uniform, yellowish-brown colour, a strong, camphoraceous odour and disagreeably bitter and acrid taste. Virginian serpentary, from *A. Serpentaria*, resembles the Texan, but may be distinguished by its shorter, more wiry, and usually matted roots.

The drug contains a bitter principle, apparently an alkaloid, crystallising in pale, yellow needles, together with from 1 to 2 per cent. of volatile oil (specific gravity, 0.975 to 0.990), containing a terpene, borneol, and an ester of borneol. It yields from 6 to 9 per cent. of ash, which may be much increased by the earthy matter often adhering to the drug.

Serpentary root is a bitter substance employed with mineral acids and other bitters. The infusion is a useful vehicle for tonic mixtures.

**SERUM ANTIDIPHThERICUM.**

## ANTIDIPHThERIC SERUM.

*Synonym.*—Diphtheria Antitoxin.

Antidiphtheric serum consists of the serum obtained from the blood of horses rendered immune or insusceptible to diphtheria toxin, by means of subcutaneous or intravenous injections of the toxic products of diphtheria germs, in repeated and gradually increasing doses. The blood of the animal in this condition is drawn to the required amount, allowed to clot, and the fluid portion, or serum, which contains the antitoxin in solution, collected in sterilised receivers under suitable, aseptic precautions, and some preservative added, such as phenol or tricresol. Besides the antitoxin the serum contains the normal organic and inorganic constituents of blood serum. This fluid is set aside for some weeks, during which time a precipitate forms which is finally removed by filtration through a sterilised, porcelain filter, the filtered liquid tested for strength, asepsis, etc., and bottled.

This antitoxin occurs as a nearly transparent, straw-coloured or yellowish-brown liquid, having no odour of its own, but usually smelling of an added antiseptic. It gives the proteid reactions, and is precipitated on heating, and by alcohol. Specific gravity, about 1.026. Total solids, about 9.5 per cent. On keeping, it gradually loses its power—to the extent of 10 to 30 per cent. per annum. It should be enclosed in sealed, glass vessels, containing a single dose only, and kept in a dark and cold place.

Dried diphtheria antitoxin is obtained by carefully evaporating the fluid preparation at a temperature below 40°, or by desiccation over sulphuric acid, *in vacuo*. It occurs in the form of amber-coloured transparent scales, or granules, or as a yellowish-white, amorphous powder. It is used for preparing the liquid antitoxin extemporaneously by dissolving it in the requisite amount of sterilised water.

The dose of diphtheria antitoxin varies according to the severity and stage of the disease, not with the age of the patient. The dose is reckoned in “units of immunity”; the strength of the serum is estimated by the amount required to neutralise a definite quantity of toxin, a “unit of immunity” being defined as the amount of antitoxin required to neutralise about 100 lethal doses of toxin for a guinea-pig of a certain weight. Thus the volume of fluid containing a given number of units of immunity varies according to the potency of the specimen. The date of standardisation should be stated on each bottle, and it is well not to employ samples more than three months old.

Antidiphtheric serum is truly antitoxic, neutralising the toxin elaborated locally at the seat of disease, but affecting only to a limited extent the vitality of the infecting organisms. Pathological changes induced by the toxin are not affected by antitoxin. It is, therefore, usual to carry out local measures of disinfection to prevent

further absorption of toxin whilst administering the serum to neutralise toxin already present in the circulation. An antibacterial serum for local application to the fauces has been prepared.

*Dose.*—Curative, 2000 to 4000 units in mild cases treated early; up to 30000 units in severe cases treated at a later stage, given subcutaneously or intravenously. For prophylactic purposes 500 units may be injected subcutaneously. Subcutaneous injections are usually made in flank or between the shoulders.

## SERUM ANTIPESTIS.

### ANTIPLAGUE SERUM.

Antiplague serum consists of the serum obtained from the blood of horses which have been immunised by intravenous inoculation, in increasing doses, of living cultures of plague bacilli. Many strains isolated from different epidemics are used for this purpose. After the animal has undergone the immunising treatment for about six months an interval of a fortnight is allowed to elapse between the last dose and the withdrawal of blood.

The serum is a straw-coloured or yellowish-brown liquid resembling antidiphtheric serum, but is less potent than the antidiphtheric and antitetanic sera. Its action is bactericidal as well as antitoxic; when administered early and in large doses it is of great value in the treatment of bubonic plague.

*Dose.*—20 mils at once intravenously, followed by two subcutaneous injections of at least 40 mils each within twenty-four hours, and later 10, 20, or 40 mils daily, according to the condition of the patient, until the temperature becomes normal. For the intravenous inoculations the serum is warmed to blood heat, strained through a piece of sterilised muslin if necessary, and injected into one of the superficial veins of the hand or arm.

## SERUM ANTISTREPTOCOCCICUM.

### ANTISTREPTOCOCCIC SERUM.

Antistreptococcic serum consists of the serum obtained from the blood of the horse or ass gradually immunised by subcutaneous injections of cultures of the *Streptococcus pyogenes* or *S. crysipelatos*. The microbe forms but little toxin in cultivations, and immunisation has therefore to be effected by means of the cultures, these being grown for two to three weeks, and the whole, or unfiltered culture, containing both microbes and toxin, used for the inoculation. The earlier injections consist of the killed cultures, that is, the cultures which have been heated on a water-bath for one to three hours at 58° to 60°; later, when some immunisation has taken place, the living cultures are employed, being injected intravenously. The process is very slow, some six to twelve months being necessary before a sufficiently active serum is obtainable.



Since one streptococcus may not afford a protective action against another the serum should be a polyvalent one, that is, one prepared with a large number of strains of the streptococcus derived from different sources.

It occurs as a straw-coloured or yellowish-brown liquid, having the same chemical and physical properties as diphtheria antitoxin. It should be perfectly fresh when used, as it does not keep well. It has been suggested for use as a prophylactic before operations in the mouth, throat, and urinary tract, to prevent septic complication, 10 mls being given for three days before operation.

Antistreptococcic serum is employed in all forms of streptococcic septicæmia, and is usually found of especial value in erysipelas and puerperal fever, though it occasionally fails to exert any influence even in pure streptococcic infections. The serum is bactericidal in its action, promoting the dissolution of the infecting organisms in the circulation. It has been found of use in some forms of chronic rheumatism, and has been recommended for rectal use in gonorrhœa.

*Dose.*—30 mls, repeated daily, subcutaneously.

*NOTE.*—Some Continental authorities advise a dose of 50 to 150 mls of this serum.

## SERUM ANTITETANICUM.

### ANTITETANIC SERUM.

*Synonym.*—Tetanus Antitoxin.

Antitetanic serum consists of the serum obtained from the blood of horses rendered immune by repeated inoculations with increasing quantities of tetanus toxin, obtained from pure cultures of the tetanus bacillus, *Bacillus tetani* of Nicolaier. This bacillus, being an anaërobe, cultures are best obtained by means of a sodium sulphindigotate broth, which consists of ordinary bouillon, to which 0.3 per cent. of sodium sulphindigotate has been added. The medium is then inoculated and incubated, and the toxin broth thus obtained filtered through a porcelain filter, and preserved. When the desired immunity has been obtained the animals are bled, the serum collected, and 0.5 per cent. of phenol or other antiseptic added if desired.

It occurs as a straw-coloured or yellowish-brown liquid, having the same chemical and physical properties as diphtheria antitoxin. For therapeutic use it should possess a potency of not less than 1000000, as reckoned by the Roux unit, *i.e.*, 1 mil should be sufficient to protect 1000000 grammes of guinea-pig against the minimal lethal dose of tetanus toxin.

Antitetanic serum is truly antitoxic, *i.e.*, it neutralises the toxin of the organism of tetanus, rendering it inert. Its neutralising power is most marked *in vitro*; as a curative agent in acute tetanus its action is somewhat disappointing, owing to the fact that the tetanus poison has so extraordinary an affinity for nerve cells that a considerable concentration of antitoxin is required subsequently to

overcome it. It is also not until the action of the toxin upon nerve tissue is exerted that symptoms of tetanus arise; as in the case of diphtheria, the antitoxin can destroy the toxin, but will not influence pathological effects already produced. The early treatment of tetanus being of supreme importance, the antitoxin is of greatest use as a prophylactic. It does not immunise for more than three weeks, and since the incubation period of tetanus may be as long as one month, 10 mils should be injected if there be any likelihood of tetanus ensuing, 10 mils a fortnight afterwards, and a third injection in another fortnight.

*Dose.*—Subcutaneously, 20 to 100 mils; intravenously, 10 mils; intracerebrally, or intraspinally, 2·5 to 5 mils. For intracerebral or intraspinal injection 1 gramme of the dried antitoxin is dissolved in 5 mils of sterilised water.

NOTE.—Dried tetanus antitoxin, which has been recommended as a dressing for wounds, as well as to prepare a solution for injection, is obtained by drying the serum *in vacuo*, so as to produce scales.

## SERUM ANTITHYROIDEUM.

### ANTITHYROID SERUM.

*Synonyms.*—Thyroid Serum; Moebius's Antithyroidin.

Antithyroid serum consists of the serum obtained from the blood of sheep which have had the thyroid glands removed some six weeks before the first withdrawal of blood. It is preserved by the addition of 0·5 per cent. of phenol.

It occurs as a straw-coloured, yellowish-brown liquid, having the same chemical and physical properties as diphtheria antitoxin.

The principle upon which this serum is used is based upon the supposition that the poisoning of the system in Graves' disease is caused by an over-production of the secretion of the thyroid glands which normally neutralises a toxin present in the body. The blood serum of animals, therefore, from which the glands have been removed, would contain material to counteract this state. The results of its use in cases of exophthalmic goitre, and also in diabetes, have been favourably reported upon. It does not appear to cause constitutional disturbances, and the general condition of the patients is said to be improved.

*Dose.*—Administered by mouth, 5 decimils (8 minims) thrice daily, gradually raised to 5 mils (75 minims).

NOTES.—Dried antithyroid serum is also prepared. It may be given in cachets or in capsules; dose, 3 decigrams (5 grains).

## SERUM ANTIVENOSUM.

### ANTIVENOMOUS SERUM.

*Synonyms.*—Antivenene; Snake Venom Antitoxin.

Antivenomous serum consists of the serum obtained from the blood of the horse rendered immune by cautious subcutaneous injections

of snake venom. The venom is usually obtained from snakes which have been killed, the venom glands being dissected out, the venom dissolved from them by means of distilled water, and the solution thus obtained evaporated to dryness *in vacuo* over sulphuric acid. From the living snakes the poison is obtained by inducing them to bite rubber-covered, shallow dishes. In the dry state the venom may be kept almost indefinitely.

This antitoxin occurs as a straw-coloured or yellowish-brown liquid having the same chemical and physical properties as diphtheria antitoxin.

The active principles of snake venom are of the nature of proteins, and consist of a globulin body and a peptone body existing in varying proportions in different venoms. That of the cobra consists of 2 per cent. of the globulin and 98 per cent. of the peptone, while that of the rattlesnake contains 25 per cent. of the former and 75 per cent. of the latter. To the globulin is attributed the local symptoms of snake bites, such as swelling and pain; while to the peptone the general symptoms, convulsions, paralysis, etc., are ascribed.

The antivenene of Calmette is prepared by using a mixture of 50 per cent. cobra poison with 20 per cent. viperine venom. On account of its intensely powerful nature the venom is heated before being used for injection, and it has recently been contended that the act of heating practically destroys the viperine poison, so that the antitoxin produced is active only against cobra bite. In practice this serum is found not to immunise against the bites of viperine snakes, and its utility is much limited by this circumstance. On the assumption that the venom of different genera of colubrine snakes is similar, antivenene should protect against the bite of the cobra, krait, and death-adder. Its action is problematical in the case of the viperine snakes, of which the chief are common viper, daboia, puff-adder, rattlesnake, and tiger-snake.

*Dose*.—10 to 40 mils, injected subcutaneously in the neighbourhood of the bite; if some time has elapsed after the bite a further 10 mils are injected intravenously.

*NOTES*.—In addition to the immediate use of antivenomous serum, vigorous local treatment should be undertaken. A ligature should be applied above the limb if the site permit; the wound opened up and syringed with solution of chlorinated lime or dressed with powdered potassium permanganate, ether and ammonia being given by the mouth and strychnine subcutaneously. Antivenomous serum loses its strength in keeping.

## SEVUM BENZOATUM.

### BENZOATED SUET.

Benzoin, in powder	...	...	...	...	3'00
Prepared Suet	...	...	...	...	100'00

Add the benzoin to the suet, previously melted on a water-bath, and continue the application of heat for two hours, stirring frequently; finally strain, and stir until cold.



Benzoated suet should be used instead of benzoated lard in preparing ointments for native use in India.

NOTES.—Benzoated beef tallow may be prepared in a similar way. It is used in making plasters with an indiarubber basis.

### SEVUM PHOSPHORATUM.

#### PHOSPHORATED SUET.

Phosphorus	...	...	...	...	10.00
Carbon Bisulphide	...	...	...	...	50.00
Prepared Suet	...	...	...	...	90.00

Dissolve the phosphorus in the carbon bisulphide, add a little of the suet, and mix quickly; then add the remainder of the suet, mix thoroughly, and allow the carbon bisulphide to evaporate.

Phosphorated suet contains 10 per cent. of phosphorus, and is employed in the preparation of phosphorus pills; in the absence of other ingredients a little powdered liquorice and compound tragacanth powder should be added, with a few drops of chloroform to prevent oxidation, and the mass prepared with mucilage of acacia.

*Dose.*—6 to 30 milligrams ( $\frac{1}{10}$  to  $\frac{1}{2}$  grain).

### SEVUM PRÆPARATUM.

#### PREPARED SUET.

*Synonym.*—Mutton Suet.

Prepared suet consists of the internal fat of the abdomen of the sheep, *Ovis aries*, Linn. (Order Ungulata), prepared by cutting the fresh omentum into pieces, crushing the pieces so as to break the membranous vesicles in which the fat is enclosed, then melting and straining. The purified fat should be stirred while cooling, to prevent the separation of constituents of high melting-point in a more or less granular form.

It occurs as a white, almost inodorous, solid fat, with a bland taste. Melting-point,  $45^{\circ}$  to  $50^{\circ}$ , congealing between  $37^{\circ}$  and  $40^{\circ}$ . Insoluble in water or cold alcohol, soluble in boiling alcohol (1 in 44), in ether (1 in 60), and in petroleum benzin (1 in 2), from which solution crystals separate on standing. The alcoholic solution should be neutral, or only slightly acid.

The chief constituents of suet are stearin and palmitin, about 70 to 80 per cent. of which are present, together with about 20 to 30 per cent. of olein. Prepared suet should be used instead of lard in preparing ointments and plasters for native use in India. It should be kept in well-stoppered bottles, as on prolonged exposure to air it becomes rancid, and unfit for use.

Prepared suet is used in the preparation of Unguentum Hydrargyri, and is a convenient solvent of phosphorus and salicylic acid (see *Sevum Phosphoratum* and *Sevum Salicylatum*).

NOTES.—Beef tallow is nearly white when freshly rendered, free from disagreeable odour, and almost tasteless. It contains the following mixed glycerides:—Oleodipalmitin, stearodipalmitin, oleopalmitostearin, and palmitostearin. Beef tallow is less rich in stearin than mutton suet.

### SEVUM SALICYLATUM.

#### SALICYLATED SUET.

Salicylic Acid	...	...	...	...	...	2·00
Benzoic Acid	...	...	...	...	...	1·00
Prepared Suet	...	...	...	...	...	97·00

Melt the suet on a water-bath, dissolve the salicylic and benzoic acids, stir thoroughly, and allow to solidify.

Salicylated suet is used in place of Unguentum Acidi Salicylici for application to the skin in eczema, acne, seborrhœa, etc.

NOTE.—This preparation corresponds to Sebum Salicylatum of the German Pharmacopœia.

### SIMARUBÆ CORTEX.

#### SIMARUBA BARK.

Simaruba bark consists of the dried root-bark of *Simaruba amara*, Aublet, and of *S. glauca*, DC. (N.O. Simarubeæ), tall trees, the former indigenous to Venezuela and Guiana, the latter to the West Indies and Florida.

The bark at present in commerce is that of *S. amara*. It occurs in long, very fibrous strips, more or less fissured and torn longitudinally, and of a buff or yellowish-brown colour. The outer surface is rough and deprived of its cork, the inner surface longitudinally striated. It has no odour, but a bitter taste.

The chief constituent of the bark is a crystalline, bitter principle, which is probably identical with quassin or picrasmin; it also contains a fluorescent body, and a yellow resin.

Simaruba bark is used as a bitter and astringent in chronic dysentery. For the latter purpose, a decoction is prepared (1 in 20), often with an equal quantity of cinnamon bark.

*Dose*.—1 to 2 grammes (15 to 30 grains).

NOTE.—Simaruba bark in hard, flat pieces is occasionally met with in commerce; it is probably stem-bark.

### SINAPIS.

#### MUSTARD.

*Synonym*.—Ground Mustard.

Mustard consists of the dried, ripe seeds of *Brassica sinapioides*, Roth., and *Brassica alba*, Boiss. (N.O. Cruciferae), powdered and mixed.

It occurs as a greenish-yellow, odourless powder, with a bitter, pungent taste, and gives off a pungent odour when moist. It should be free from starch and turmeric.

Mustard causes redness and a feeling of warmth when applied to the skin or mucous membrane; if the action is prolonged vesication

is produced. It is employed externally as a counter-irritant either in the form of poultice or as mustard paper (see *Cataplasma* and *Charta Sinapis*). Mustard baths for the feet are used in sleeplessness and in incipient colds, and a mustard sitz-bath is employed in amenorrhœa (1 tablespoonful to each gallon of water). Internally mustard is used as a condiment; it increases the flow of saliva and improves the appetite. Mixed with hot water (1 tablespoonful to a tumblerful) it is a prompt emetic, and is used especially in narcotic poisoning.

NOTE.—Powdered mustard should not be mixed with boiling water, or the pungent, volatile oil will be developed only to a limited extent, owing to the destructive action of excessive heat on myrosin.

### SINAPIS ALBÆ SEMINA.

#### WHITE MUSTARD SEEDS.

White mustard seeds are obtained from *Brassica alba*, Boiss. (N.O. Cruciferae), an annual herb, largely cultivated in temperate climates.

The dried ripe seeds are yellow in colour, minutely pitted and nearly spherical, about 2 millimetres in diameter. Internally yellow and oily, a transverse section showing two folded cotyledons embracing a small radicle. When soaked in water they become coated with mucilage. Odour slight, taste pungent, but the crushed seeds moistened with water exhale no pungent odour. The powdered seed, after removal of the fixed oil by ether-alcohol, exhibits under the microscope the following characteristic cells and tissues:—Fragments of the sclerenchymatous layer appear in surface view as groups of small, yellow, strongly thickened, polygonal cells; epidermis, consisting of large, polygonal, thin-walled cells filled with colourless striated mucilage; hypodermis of large polygonal cells with moderately thick walls and intercellular spaces; cotyledons and radicle composed of small thin-walled cells containing minute, irregular, aleurone grains in which are a few, very minute globoids. Starch is either entirely absent or present only in the form of isolated groups of minute rounded grains derived from the occasional presence of an unripe seed.

The seeds contain a crystalline glucoside, sinalbin, together with an enzyme ferment, myrosin. The latter in the presence of water hydrolyses the sinalbin, producing acrinyl isothiocyanate, sinapine acid sulphate, and dextrose. Acrinyl isothiocyanate is a yellow oily liquid with pungent taste and powerful, rubefacient action, but as it is not volatile it has no pungent odour. Sinapine is an alkaloid, but is so unstable that it has not yet been isolated. White mustard seeds contain in addition fixed oil (about 30 per cent.), proteids (about 25 per cent.), and mucilage. They yield from 4 to 5 per cent. of ash on incineration.

White mustard seeds are used for the extraction of the fixed oil, and are mixed with black mustard seeds, in powder, for use as "ground mustard" (see *Sinapis*).



**SINAPIS NIGRÆ SEMINA.****BLACK MUSTARD SEEDS.**

Black mustard seeds are obtained from *Brassica sinapioides*, Roth. (N.O. Cruciferae), an annual herbaceous plant, largely cultivated in temperate climates.

The dried, ripe seeds are minute, about 1 millimetre in diameter, nearly spherical, dark reddish-brown or greyish-brown in colour. Outer surface distinctly pitted, internally yellowish and oily, the section exhibiting two folded cotyledons embracing a small radicle. When soaked in water the seeds become surrounded by mucilage. The entire seeds are odourless; when powdered they have a slight, characteristic odour, but when the powder is moistened the odour becomes strong and pungent, attacking the mucous membrane of both eyes and nostrils. Taste at first bitter, but rapidly becoming pungent. The powdered seeds exhibit under the microscope characters similar to those described for white mustard, but differing chiefly in the following particulars:—The fragments of the sclerenchymatous layer are dark yellowish-brown in colour, and exhibit distinct, large, dark reticulations; the cells of the hypodermis have thinner walls; the mucilage in the epidermal cells exhibits no striations.

The seeds contain a crystalline glucoside, sinigrin, and an enzyme ferment, myrosin. In the presence of water these bodies give rise to allyl isothiocyanate, potassium acid sulphate, and dextrose. Allyl isothiocyanate (essential oil of mustard) is a mobile, volatile liquid, with an extremely pungent odour and taste. The drug yields from 0·7 to 1·3 per cent. of this volatile oil, Dutch seed being the best. In the oil, allyl isothiocyanate is generally accompanied by other bodies, such as allyl cyanide. Black mustard seeds also contain fixed oil (about 27 per cent.), proteids (about 29 per cent.), and mucilage, and yield from 4·2 to 5·7 per cent. of ash.

Black mustard seeds are used in the preparation of the volatile and fixed oils, and mixed with white mustard seeds, as "ground mustard."

NOTES.—"Mustard bran" consists of the integuments of white and black mustard seeds. It has properties similar to those of ground mustard, but is much weaker in its action.

**SODA TARTARATA.****SODIUM POTASSIUM TARTRATE.**

*Synonyms.*—Tartarated Soda; Potassii et Sodii Tartras; Potassium and Sodium Tartrate; Rochelle Salt; Seignette's Salt.

Sodium potassium tartrate,  $\text{KNaC}_4\text{H}_4\text{O}_6, 4\text{H}_2\text{O}$ , may be prepared by neutralising acid potassium tartrate with sodium carbonate in presence of water, and crystallising the resulting solution.

It occurs in the form of prismatic crystals or as a white, odourless powder, and has a cooling and mild, saline taste.

Soluble in water (1 in  $1\frac{1}{2}$ ), but insoluble in alcohol. Its aqueous solution is neutral or only faintly alkaline to litmus. On heating to between  $70^{\circ}$  and  $80^{\circ}$ , the salt melts in its water of crystallisation to a colourless solution, and on further heating becomes brown and finally carbonises, leaving a residue of the alkali carbonates and carbon. This when treated with water and filtered yields a solution which, determined volumetrically, should indicate not less than 98 per cent. of sodium potassium tartrate. It should be free from arsenium, lead, copper, and iron, and should contain not more than traces of calcium, magnesium, chlorides or sulphates. When heated with solution of potassium hydroxide, the solution should not evolve the odour of ammonia.

Sodium potassium tartrate is a typical saline cathartic, causing a watery evacuation of the bowel without producing irritation (see *Potassii Tartras* and *Magnesii Sulphas*). In small doses it is a diuretic and renders the urine less acid. It is employed in rheumatic and gouty disorders, to relieve hepatic congestion and generally as a mild purgative. It is largely prescribed in the effervescent form as "*Seidlitz Powder*."

*Dose*.—3 to 16 grammes (120 to 240 grains).

*NOTE*.—Partly dried tartarated soda is sometimes used in preparing seidlitz powders.

## SODII ACETAS.

SODIUM ACETATE.



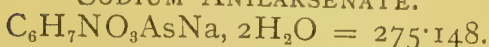
Sodium acetate may be prepared by neutralising acetic acid with sodium carbonate, bicarbonate, or hydroxide, and crystallising the resulting solution.

It occurs in the form of colourless, translucent, monoclinic prisms, or as a white, granular, crystalline powder, odourless, and having a cooling saline, slightly bitter taste. Efflorescent in warm air. Soluble in water (1 in 1); in alcohol (1 in 30); in all proportions of boiling water and boiling alcohol. The aqueous solution has an alkaline reaction. On heating it first liquefies, then becomes anhydrous at  $123^{\circ}$ ; at a higher temperature it is decomposed, giving off inflammable vapours with an empyreumatic odour and leaving a residue of sodium carbonate. The saturated aqueous solution is not rendered turbid by solution of sodium acid tartrate (absence of potassium). It should be free from arsenium and more than traces of the heavy metals.

Sodium acetate has been given as a diuretic, but is seldom used in medicine, as the potassium salt is preferred. It is excreted as carbonate in the urine, which it renders less acid. The salt is used in the preparation of acetic ether.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

*NOTE*.—Solution of sodium acetate is a 10 per cent. w/v aqueous solution.

**SODII ANILARSENAS.****SODIUM ANILARSENATE.**

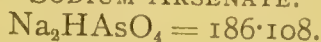
Sodium anilarsenate,  $\text{C}_6\text{H}_7\text{NAsO}_3\text{Na}, 2\text{H}_2\text{O}$ , the mono-sodium salt of ortho-arsenic acid anilide, contains 27.2 per cent. of arsenium.

It occurs as a white, crystalline powder, odourless, and having a slight saline taste. Soluble in water (about 1 in 6); in alcohol (about 1 in 125). Solutions of the salt reduce potassium permanganate and gold chloride; ferrous sulphate gives an olive-green precipitate, bromine water a white precipitate, and sodium hypobromite a blue-red colour (distinction from other arsenical compounds).

This organic arsenical compound has recently come into prominence for the treatment of trypanosomiasis and syphilis. For sleeping sickness, a 20 per cent. solution has been recommended to be injected warm, hypodermically, at first in small daily doses, gradually increasing to 1 mil. This solution may, however, cause inflammation at the site of injection, and a 10 per cent. is better. After a week's treatment, injections of 1 mil of 1 per cent. solution of corrosive sublimate are given on four successive days in place of the arsenical injections. Sodium anilarsenate is also used in association with some aniline colours that exert a specific action upon trypanosomes, such as fuchsine, methylene blue, and trypan red. In the treatment of syphilis, large doses (up to 5 decigrams) of this salt have been given by hypodermic injection, but they are sometimes followed by toxic symptoms. Sodium anilarsenate is used for chronic skin diseases, similarly to sodium cacodylate and metharsenite.

*Dose.*— $\frac{1}{2}$  to 2 decigrams ( $\frac{3}{4}$  to 3 grains).

*NOTE.*—Sodium anilarsenate is also known under the trade-name Atoxyl.

**SODII ARSENAS.****SODIUM ARSENATE.**

*Synonyms.*—Sodium Arseniate; Disodium Hydrogen Arsenate;

Sodii Arsenas Exsiccatus; Exsiccated Sodium Arsenate.

Sodium arsenate,  $\text{Na}_2\text{HAsO}_4$ , may be obtained in the anhydrous state by heating the crystalline salt to a temperature of  $149^\circ$  until it ceases to lose moisture. The crystallised salt is prepared by fusing together a mixture of arsenious anhydride, sodium nitrate, and sodium carbonate until evolution of gas ceases; the fused mass is then treated with water and subsequently crystallised. The crystalline salt being very efflorescent and the proportion of arsenic, therefore, uncertain, the more stable, anhydrous salt is invariably used.

The anhydrous salt occurs in the form of a white powder, odourless, granular, and amorphous. Soluble in water (1 in 6), slightly soluble in alcohol. The aqueous solution has an alkaline reaction, due to partial hydrolysis. The official test, which requires that 1 gramme of sodium arsenate dissolved with 1 gramme glacial acetic acid in 50 mls of water should require 2.03 grammes of lead



acetate for complete precipitation, though not strictly accurate, is substantially correct. It should be free from lead, copper, iron, aluminium, calcium, magnesium, potassium, ammonium, carbonates, nitrates, or sulphates, and contain only traces of chlorides. When heated to a temperature of  $149^{\circ}$  it should not lose more than 2 per cent. of its weight.

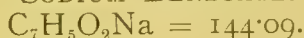
Sodium arsenate has a mild arsenic action. It is employed in chronic skin diseases, in some forms of anæmia, and in parasitic diseases of the blood, such as trypanosomiasis in man or animals. It is given in mixtures as *Liquor Sodii Arsenatis* or in pills prepared by triturating the salt with milk sugar and massing with syrup of glucose. For hypodermic use, a solution containing 0.5 per cent of sodium arsenate may be employed in doses of 1 mil (15 minims).

*Dose.*— $1\frac{1}{2}$  to 6 milligrams ( $\frac{1}{40}$  to  $\frac{1}{10}$  grain).

*NOTES.*—Each 6 centigrams (1 grain) of the anhydrous salt is equivalent to about 10 centigrams (1.67 grains) of the crystalline salt. The dried salt is slightly hygroscopic, and should be freshly dried when required for making *Liquor Sodii Arsenatis*. *Sodii Arsenas*, U.S.P., is the crystalline salt (disodium orthoarsenate,  $\text{Na}_2\text{HAsO}_4 \cdot 7\text{H}_2\text{O} = 309.84$ ).

## SODII BENZOAS.

### SODIUM BENZOATE.



Sodium benzoate,  $\text{C}_6\text{H}_5\text{COONa}$ , may be prepared by neutralising benzoic acid with solution of sodium carbonate, and crystallising, or carefully evaporating the solution to dryness.

It occurs as a white, amorphous, granular or crystalline powder, odourless or having a faint odour of benzoin, and a sweetish, astringent taste. Soluble in water (1 in 2) and in alcohol (1 in 24). The aqueous solution is neutral, or has a faintly alkaline reaction. On heating, the salt melts, giving off the odour of benzoin (if prepared from natural acid), and at a higher temperature chars, finally leaving a residue of sodium carbonate. It is stated officially that this residue determined volumetrically should indicate about 98 per cent. of sodium benzoate. A strong, aqueous solution yields, on the addition of hydrochloric acid a crystalline magma of benzoic acid. Sodium benzoate should be free from lead, copper, iron, calcium, magnesium, potassium, ammonium, and carbonates, and almost free from chlorides or sulphates.

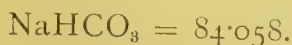
Sodium benzoate has the action of benzoic acid, but is less irritating and is also preferred on account of its ready solubility in water (see *Acidum Benzoicum*). It is sometimes employed as an expectorant, but is used principally as an antiseptic in cystitis, and for its supposed action as an antilithic in gout and rheumatism. It is given usually in mixture form and may also be dispensed in cachets. It is incompatible with mineral acids and with ferric salts.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

*NOTE.*—Commercial specimens of the salt rarely attain the above standard, as it is very difficult to dry the salt completely, and it contains on an average 4 per cent. of moisture.

**SODII BICARBONAS.**

SODIUM BICARBONATE.



Sodium bicarbonate,  $\text{NaHCO}_3$ , may be obtained by exposing crystals of sodium carbonate, previously deprived of a portion of their water of crystallisation, to the action of carbonic anhydride, or by the interaction of sodium chloride and ammonium bicarbonate.

It occurs in the form of a white, minutely crystalline powder, or in small, opaque, monoclinic crystals; odourless, having a saline taste, and a weak alkaline reaction. Soluble in cold water (1 in 12), insoluble in alcohol. Aqueous solutions are gradually decomposed at ordinary temperatures into normal carbonate; the decomposition is accelerated by agitation or by warming the solution. An aqueous solution of the salt obtained at  $15^\circ$  without agitation, gives, on the addition of solution of mercuric chloride, a whitish opalescence or precipitate, becoming brownish-red on standing (distinction from carbonate). A similar solution, containing 1 gramme in 20 mils of distilled water, should not at once assume a red colour on the addition of 3 drops of phenol-phthalein solution. Should a slight reddish colour be visible 0.2 mil of normal solution of hydrochloric acid should completely remove it (limit of carbonate). If solution of ferric chloride be added to an aqueous solution acidulated with hydrochloric acid no red colouration should appear (absence of thiocyanates). Determined volumetrically not less than 98.3 per cent. of sodium bicarbonate should be indicated. It should be free from lead, copper, iron, aluminium, calcium, magnesium, potassium, sulphites, thiosulphates, phosphates, and thiocyanates, and practically free from chlorides, sulphates, or ammonium.

The action of the carbonates of the alkalis is almost entirely that of the  $\text{CO}_3$  group, that of the metal is negligible (for the action of the sodium ion see Sodii Chloridum). They possess a characteristic, soapy taste in the mouth, where they dissolve mucus and neutralise acid secretions. In the empty stomach they inhibit gastric secretion, and in excessive acidity very great benefit is obtained with relief of pain and distension. When taken for some time alkalis diminish the flow of pancreatic juice, owing to a less acid chyme passing into the duodenum, with a consequent reduction in the amount of pancreatic secretin formed. After absorption the alkali carbonates increase the alkalinity of the tissues, and there is an increased excretion of urine, which is rendered less acid. The carbonates are largely employed in medicine with the object of retaining uric acid in solution in the urinary passages; they are of no value for dissolving uric acid already precipitated, but they form a means of preventing further precipitation. Potassium bicarbonate and lithium carbonate are preferred for this purpose, since the biurates of these metals are more readily soluble in water than sodium biurate. Alkalis are of the greatest value in all cases of acidæmia. Thus they are given in phosphorus and arsenic poisoning; and in the treatment of diacetic

coma they exert a marvellous action by neutralising the acid which is the cause of the condition. Sodium bicarbonate closely resembles potassium bicarbonate in its properties, but is absorbed more slowly (see Potassii Bicarbonas). It is best administered in dilute aqueous solution. To relieve the pain and eructation of hyperacidity the dose is given twenty to thirty minutes after a meal. In order to inhibit excessive secretion in the stomach and stimulate the appetite, it is given with bitters thirty minutes before a meal. It is of great value in dyspepsia and in the bilious vomiting of children. For this purpose the sodium bicarbonate in excess may be given with citric acid, in effervescence. In gout, rheumatism, and acidity of the urine, small doses are given frequently; in the acid intoxication of the later stages of diabetes and in diabetic coma good results have followed the administration of large doses of sodium bicarbonate. Lozenges are prepared for use in dyspepsia. For its action in dissolving mucus, sodium bicarbonate is added to spray solutions and washes for the throat and nose (see Nebula Alkalina Composita and Glycerinum Thymolis Compositum). A weak solution (1 in 150) is applied to the skin to relieve the irritation of urticaria and eczema.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

NOTE.—For neutralisation, 20 of sodium bicarbonate require 16·7 of citric acid, or 17·8 of tartaric acid.

## SODII BISULPHIS.

SODIUM BISULPHITE.

$\text{NaHSO}_3 = 104\cdot118$ .

*Synonym.*—Sodium Acid Sulphite.

Sodium bisulphite,  $\text{NaHSO}_3$ , may be prepared by passing sulphur dioxide to saturation into a solution of caustic soda or sodium carbonate. By cooling or evaporation at the ordinary temperature the salt is obtained in crystals.

It occurs in the form of opaque, prismatic crystals, or as a granular powder, having an odour of sulphur dioxide and an unpleasant, sulphurous, saline taste. Easily soluble in cold water; in boiling water (about 1 in 2), in boiling alcohol (about 1 in 50). The aqueous solution has an acid reaction on blue litmus. On exposure to the air it becomes slowly oxidised to sulphate. In contact with acids it evolves sulphur dioxide. It dissolves sulphur, forming sodium thiosulphate, and also the haloid salts of silver. When heated it decrepitates and gives off water, sulphur dioxide, and sulphur, leaving sodium sulphate as a residue. It is a powerful reducing agent owing to the facility with which it passes into sodium sulphate. One gramme dissolved in 10 mls of diluted nitric acid and heated to expel the gases should not become turbid (absence of thiosulphate). It should be free from arsenic and other heavy metals.



Sodium bisulphite is extensively used for treating fabrics after bleaching with chlorine to neutralise excess. In medicine it is used as an antiseptic and antiferment. Small doses in dilute solution are given to allay gastric fermentation, in place of sulphurous acid, and a solution (1 in 8) forms an antiseptic application to aphthæ. The salt should be kept in a cool place in small, completely filled, well-stoppered bottles.

*Dose.*—3 to 6 decigrams (5 to 10 grains).

*NOTE.*—Sodium metabisulphite,  $\text{Na}_2\text{SO}_3\text{SO}_3$  ( $\text{Na}_2\text{S}_2\text{O}_5 = 190.22$ ), is an acid salt, which is said to separate in lustrous prisms from concentrated hot solution of sodium hydroxide, saturated with sulphur dioxide; it is also known as sodium pyrosulphite and sodium anhydrosulphite.

## SODII BROMIDUM.

SODIUM BROMIDE.

$\text{NaBr} = 103.01.$

Sodium bromide,  $\text{NaBr}$ , may be prepared by the method described under Potassii Bromidum, using sodium hydroxide in place of potassium hydroxide. In order, however, to obtain the anhydrous salt the solution is crystallised at a temperature above  $50^\circ$ .

It occurs in the form of colourless, white, cubical crystals, or as a white, granular powder, somewhat deliquescent (absorbing 3 or 4 per cent. of moisture from the air), inodorous, and having a saline, slightly bitter taste. Soluble in water (1 in 1.2), in alcohol (1 in 16) the aqueous solution being neutral to litmus. Determined volumetrically 97.94 to 99.98 per cent. of sodium bromide should be indicated, a higher percentage evidencing the presence of more than traces of chlorides, while a lower percentage may be indicative of iodides or moisture. 0.5 gramme of the salt dissolved in 10 mils of distilled water should give a yellow and not a red or reddish-brown colouration on the addition of 1 decimil of test solution of ferric chloride (absence of more than 0.01 per cent. of ammonium thiocyanate). It should be free from lead, copper, arsenium, iron, aluminium, zinc, calcium, magnesium, potassium, ammonium, carbonates, cyanides, bromates, or iodates, and contain not more than traces of chlorides, iodides, or sulphates.

Sodium bromide has properties which closely resemble those of potassium bromide, but is considered erroneously to be less depressing to the heart and less irritating to the stomach (see Potassii Bromidum). It is employed in large doses in the treatment of the morphine and cocaine habits and in acute mania. In the treatment of epilepsy sodium bromide has been recommended to be given with food in place of table salt, that the bromide may to some extent take the place of chloride in the tissues, and exercise its specific effects on the nerve cells. Sodium bromide is more deliquescent than the potassium salt. It is usually given in dilute aqueous solution; if prescribed in powders they must be covered in tinfoil,

and preserved in a bottle. It may conveniently be given as Sodii Bromidum Effervescens.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains) or more.

### SODII BROMIDUM EFFERVESCENS.

EFFERVESCENT SODIUM BROMIDE.

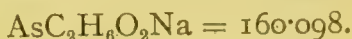
Sodium Bromide...	...	...	...	16.00
Sodium Bicarbonate, in powder	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	24.00
Citric Acid, in powder	...	...	...	16.00
Refined Sugar, in powder	...	...	...	14.00

Mix and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—2 to 8 grammes (30 to 120 grains).

### SODII CACODYLAS.

SODIUM CACODYLATE.



*Synonym.*—Sodium Dimethylarsinate.

Sodium cacodylate,  $\text{As}(\text{CH}_3)_2\text{O}_2\text{Na}$ , may be prepared by exactly neutralising an aqueous solution of cacodylic acid with sodium carbonate, evaporating and crystallising.

It occurs in the form of white, prismatic crystals, or as a white, amorphous powder, odourless, deliquescent. Commercially the salt is found in crystals, differing much in appearance according to the temperature at which it has been crystallised and the nature of the solvent, and may contain from 1 to 3.5 molecules of water of crystallisation. It is generally a mixture of several hydrated forms. The anhydrous salt contains 46.83 per cent. of arsenium, equivalent to 61.82 per cent. of arsenious oxide,  $\text{As}_2\text{O}_3$ . Soluble in water (2 in 1), in alcohol (1 in 1). Many commercial samples contain free cacodylic acid. This should be tested for, and determined, if present, by means of decinormal alkali, using phenol-phthalein as indicator. The salt is much less poisonous than sodium arsenate. It is closely related to sodium metharsenite, and care should be taken to distinguish between the two. The distinguishing tests are fully described under Sodii Metharsenis. Sodium cacodylate is neutral to litmus paper, and gives no precipitate with silver nitrate; a white precipitate turning yellow, with mercuric nitrate; no precipitate with cobalt nitrate; no precipitate either in the cold or on warming, with calcium chloride.

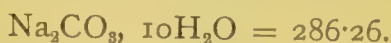
Sodium cacodylate has the properties of cacodylic acid (see Acidum Cacodylicum), and is the salt of this acid commonly used. It is recommended in all cases where arsenic is employed, especially in chronic skin affections, anæmias, malignant and tuberculous disease. Any action it possesses is due to the small number of arsenic

ions set free by decomposition of the salt; its toxicity is quite disproportionate to the amount of arsenic in the molecule, since it is absorbed and excreted mainly as cacodylate, which is itself an inert substance. It may be given internally in solution with aromatic elixir, or in pills prepared by triturating the salt with sugar of milk, and massing with glycerin of tragacanth. Administered by the mouth in these forms it communicates an alliaceous odour to the breath, a disadvantage largely avoided by the use of hypodermic injections. For the latter purpose a solution may be prepared containing 45 milligrams ( $\frac{3}{4}$  grain) in 1 mil (15 minims). More dilute solutions are employed for intravenous and rectal injection in phthisis.

*Dose.*—15 to 60 milligrams ( $\frac{1}{4}$  to 1 grain).

## SODII CARBONAS.

SODIUM CARBONATE.



Sodium carbonate,  $\text{Na}_2\text{CO}_3, 10\text{H}_2\text{O}$ , may be obtained by the interaction of sodium chloride and ammonium bicarbonate and subsequent ignition, or by the conversion of sodium chloride into sodium sulphate, and subsequent ignition of the latter with carbon and calcium carbonate.

It occurs in translucent, colourless, rhombic crystals, efflorescent, and having a harsh and strongly alkaline taste. Soluble in water (1 in 1.6); insoluble in alcohol. Its aqueous solution is alkaline to litmus and gives a reddish-brown precipitate with solution of mercuric chloride. When heated to about  $50^\circ$  the crystals fuse, and above  $80^\circ$  lose the whole of their water of crystallisation. This loss amounts to 62.93 per cent. On exposure to air the crystals effloresce, the effloresced salt containing only five molecules of water of crystallisation. Determined volumetrically, 98.02 per cent. of sodium carbonate should be indicated. It should be free from the impurities described under Sodium Bicarbonate. For neutralisation, 20 parts of sodium carbonate require 9.8 of citric acid, or 10.5 of tartaric acid.

Sodium carbonate is employed in the preparation of alkaline baths for use in scaly, skin diseases (see also Sodii Carbonas Exsiccatus), and an aqueous solution (0.5 per cent.) is used as a lotion, applied with a compress, to relieve irritation in eczema. The carbonate is also used to prepare "bath salts," being perfumed with oil of lavender for this purpose. It is too irritating for internal administration, except in very dilute solution or in effervescence with citric or tartaric acid.

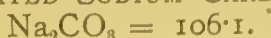
*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

*NOTES.*—Washing soda is a crude commercial form of this salt; for medicinal use it requires recrystallisation. Sodii Carbonas Monohydratus, U.S.P., contains one molecule of water of crystallisation ( $\text{Na}_2\text{CO}_3 + \text{H}_2\text{O} = 124.116$ ), and is known in commerce as "crystal soda"; it is largely employed as a water softener and bath salt. Solution of sodium carbonate is a 10 per cent. w/v aqueous solution of the salt.



**SODII CARBONAS EXSICCATUS.**

EXSICCATED SODIUM CARBONATE.

*Synonym.*—Dried Sodium Carbonate.

Exsiccated or nearly anhydrous sodium carbonate may be obtained by heating any of the crystallised forms of sodium carbonate until the water of crystallisation is expelled, or by heating the bicarbonate precipitated in the "ammonia-soda" process.

It occurs as a white, amorphous, odourless, loose powder which does not cake on pressure, and absorbs moisture from the air without becoming moist. Freely, but somewhat slowly soluble in water, the solution having the same properties as those of the crystallised salt. When strongly heated it should yield only traces of water.

Exsiccated sodium carbonate is largely used as a bath powder and water softener, to precipitate lime and magnesia salts from hard water. It is also the basis of anti-uric bath salts for use in gout and rheumatism.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

*NOTES.*—For analytical use this salt is required to be free from sulphate and chloride, a condition which can only be realised by heating the purest bicarbonate, or by repeated crystallisation of the carbonate. Each 53 grains of exsiccated sodium carbonate is equivalent to 142 grains of the crystallised salt.

**SODII CHLORAS.**

SODIUM CHLORATE.



Sodium chlorate,  $\text{NaClO}_3$ , may be prepared in the same way as potassium chlorate, most of it being produced by the electrolytic method.

It occurs in the form of colourless, translucent, tetrahedral crystals, or as a white crystalline powder, odourless, and having a cooling saline taste; permanent in air. Very soluble in water (about 1 in 1); also soluble in alcohol (1 in 100), in boiling alcohol (1 in 40), and in glycerin (1 in 5). The aqueous solution is neutral to litmus paper. It is like potassium chlorate in all its properties, and, on account of its liability to explosion under various conditions, the same precautions should be observed in dealing with it as with the potassium salt. On being heated it melts and then gives off its oxygen (45.07 per cent.), finally leaving a residue of sodium chloride. The aqueous solution is coloured greenish-yellow on warming with hydrochloric acid, and the odour of chlorine is evolved. The aqueous solution should not be rendered turbid by sodium acid tartrate (limit of potassium), and it should be free from other impurities, such as lead, copper, etc.

Sodium chlorate is used for stomatitis, relaxed sore throat, etc., in the form of gargle, pastille, and lozenge, in place of potassium chlorate, which it closely resembles in its properties. The sodium salt, however, is more soluble and more palatable.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

**SODII CHLORIDUM.**

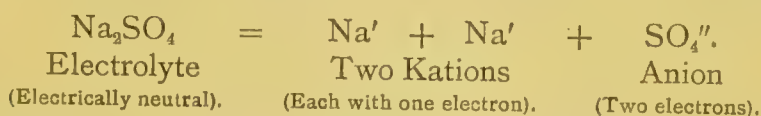
SODIUM CHLORIDE.

NaCl = 58.5.

Sodium chloride, NaCl, is obtained by the purification of common salt. It may also be obtained by neutralising sodium carbonate or sodium bicarbonate with hydrochloric acid, and evaporating the solution with constant stirring, or by passing hydrochloric acid gas into a strong, aqueous, salt solution, filtering, and recrystallising, when very pure sodium chloride results.

It occurs in colourless, transparent, cubical crystals, or as a white crystalline powder, odourless, and having a characteristic saline taste. Soluble in cold water (1 in 2.75), in almost the same proportion of boiling water; sparingly soluble in alcohol. The aqueous solution is neutral to litmus. When heated the salt decrepitates. At a red heat it fuses, and at a white heat slowly volatilises, with partial decomposition. It should be free from potassium, bromides, or iodides, and should contain not more than slight traces of calcium, magnesium, iron, or sulphates. More than traces of magnesium chloride render it hygroscopic.

The relatively inactive inorganic salts may be regarded as having two types of action (1) ionic, (2) physical. The ionic hypothesis assumes that salts, acids, etc., which in the dry state exist as molecules, and are electrically neutral, in solution split up into ions or groups, each carrying a charge of electricity called an electron. A body capable of being split up into ions is termed an electrolyte, thus:—



An electrical current passed through the solution of an electrolyte urges the anions towards the negative pole and the kations towards the positive pole, where their respective electrons are neutralised. Having lost their ionic form, they may undergo secondary changes, thus:—



Elements in the molecular and ionic condition are very different things. In the latter state the element is atomic, and is charged with electricity. No substance is entirely resolved by solution into ions, and the degree of dissociation depends on the nature of the solution, on the temperature, and concentration; many substances such as sugar, urea, and alcohol, do not ionise, but preserve in solution the molecular condition. It is believed, therefore, that it is the ions of a salt which produce a pharmacological action, and dissociable salts containing two ions will have two different effects. As examples of this hypothesis, we may point out that acids exert their disinfectant properties in proportion to their dissociation, that is to the concentration of hydrogen ions in the solution. The toxic

action of metallic salts varies again with their degree of dissociation, whilst some metallic compounds, such as those of arsenic, which do not dissociate into an arsenious ( $\text{AsO}_3$ ) or arsenic ( $\text{AsO}_4$ ) ion, such as the cacodylates, have not the characteristic actions of arsenic.

But, besides the ionic action of salts, there is a second and physical action which is negligible so long as the ionic action is strong; this physical, or "salt," action, affects living tissues through changing the physical properties of the fluids in or surrounding them. Osmosis is the principal physical change included under salt action, and osmotic processes play an important part in facilitating the movement of fluids and the diffusion of salts in the organism. The term isotonic has come to mean a solution having the same osmotic tension as that of blood serum, higher molecular concentrations are spoken of as hypertonic and lower as hypotonic. An isotonic solution of sodium chloride contains about 0.9 per cent. In the living body, however, osmotic processes, though important, are not always the deciding factor as to the action of salts, thus the ions K, Na, Li, Cl, Br, are absorbed rapidly from the intestines in any concentration, whilst Ca is absorbed more slowly, and the Mg and  $\text{SO}_4$  ions hardly at all. A saline purgative is therefore a salt which is not capable of absorption, and which by osmosis renders the contents of the bowel more watery. From 5 to 12 grammes of sodium chloride is excreted daily in the urine. Neither ion has any specific action, and the salt is therefore limited to a physical one. The most important of these actions is on the kidneys, and is common to all salts which are absorbed. When salts reach the blood by absorption, the flow of urine is increased. No matter how the salts are introduced into the blood, the effect must be to increase the liquid part of the blood. This hydræmic plethora causes dilatation of the renal vessels, a greater rate of blood flow, and an increased secretion of urine. Salts also slightly increase the perspiration and the bronchial mucus.

*Dose.*— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

## SODII CINNAMAS.

SODIUM CINNAMATE.



Sodium cinnamate,  $\text{C}_6\text{H}_5\text{CHCHCO}_2\text{Na}$ , may be prepared by neutralising a solution of sodium hydroxide with cinnamic acid. The anhydrous salt contains the equivalent of 86.44 per cent. of cinnamic acid.

It occurs as a white, granular, amorphous powder or as a white, crystalline powder, having a faint, aromatic odour and a slight alkaline reaction. Soluble in water (1 in 11), more soluble in water containing chlorides or nitrates, in alcohol (1 in 160), also in glycerin. From a solution in weak sodium hydroxide it crystallises in fine needles, containing half a molecule of water of crystallisation, and is rendered anhydrous at  $110^\circ$ . On being heated it gives off the odour of bitter almonds. The strong aqueous solution yields with the



stronger acids a precipitate of cinnamic acid. With ferric salts a yellow precipitate is formed. With manganous chloride, the cinnamate being in excess, a white precipitate of the manganous salt, soon becoming yellowish and crystalline, is produced. Strong nitric acid turns it yellow, and gives off the odour of oil of bitter almonds.

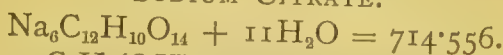
Sodium cinnamate is antiseptic, and resembles the corresponding benzoate in its pharmacological action. It has been stated to raise the number of polymorphonuclear, white blood corpuscles when injected hypodermically or intravenously, and has been recommended for use in phthisis and malignant disease on account of this action. It is, however, of very doubtful utility. Experiments on man have not confirmed the statement that it causes leucocytosis. It is employed principally as Glycerinum Sodii Cinnamatis, by subcutaneous injection.

*Dose.*—1 to 3 decigrams (2 to 5 grains).

*NOTE.*—Sodium cinnamate is also known under the trade-name Hetol.

### SODII CITRAS.

#### SODIUM CITRATE.



Sodium citrate,  $2\text{C}_3\text{H}_4(\text{OH})(\text{COONa})_3 + 11\text{H}_2\text{O}$ , the neutral or tribasic salt, may be prepared by neutralising a solution of 100 or citric acid in 500 of water, with a solution of about 200 of sodium carbonate in 600 of water, filtering, concentrating, and allowing to crystallise. The crystals are collected, drained on filter-paper, and dried. Anhydrous sodium citrate may be obtained by allowing the crystals to effloresce in warm air, and then completing the drying at  $100^\circ$ , and powdering.

It occurs in the form of small, granular crystals, or as a white, granular powder, odourless, and having a cooling, saline taste; the crystals slowly effloresce in dry air. Readily soluble in cold water, soluble in boiling water (1 in 0.4), sparingly soluble in alcohol. The aqueous solution is neutral or slightly alkaline to litmus paper. Heated above  $100^\circ$  it loses its water of crystallisation; on ignition at a red heat it is decomposed, and a mixture of sodium carbonate and carbon remains. This residue, when obtained from a weighed quantity and titrated with standard acid, should indicate a purity of not less than 97 per cent. With solution of calcium chloride it yields a clear solution in the cold, which on boiling throws down a white, granular precipitate. The aqueous solution should not be coloured by phenol-phthalein, nor effervesce with acids (absence of carbonates), nor should it show any reactions for heavy metals.

Sodium citrate resembles potassium citrate in its properties, and is similarly employed. It combines with the calcium salts of the blood, so as to delay the action of the fibrin ferment and lower the rate of clotting; added to milk its action is similar, so that the formation of large curds by the rennet of the stomach is prevented. It is employed for this action in infant feeding, milk being rendered

more readily digestible by the addition of 1 to 3 grains of sodium citrate per fluid ounce of milk. The lime salts are not removed from the milk; it seems probable that calcium citrate is formed which, though slightly soluble, does not ionise, and the calcium is therefore not available for the purposes of the ferments.

*Dose.*— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

### SODII CITRO-TARTRAS EFFERVESCENS.

EFFERVESCENT SODIUM CITRO-TARTRATE.

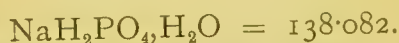
Sodium Bicarbonate, in powder	...	...	51·00
Tartaric Acid, in powder	...	...	27·00
Citric Acid, in powder	...	...	18·00
Refined Sugar, in powder	...	...	15·00

Mix and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The resulting product should weigh about 100.

*Dose.*—4 to 8 grammes (60 to 120 grains).

### SODII DIPHOSPHAS.

SODIUM DIPHOSPHATE.



*Synonyms.*—Sodium Dihydrogen Phosphate; Sodium Acid Phosphate; Monosodium Orthophosphate; Sodium Biphosphate.

Sodium diphosphate,  $\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$ , may be prepared by neutralising phosphoric acid with sodium carbonate in hot solution and mixing the solution with an equal quantity of phosphoric acid; or by mixing a solution of the disodium salt with phosphoric acid until it no longer precipitates a solution of calcium chloride. The resulting solution is concentrated, cooled, and allowed to crystallise.

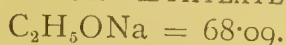
It occurs in the form of large, colourless, translucent, rhombic crystals, having an acid reaction. Soluble in water (about 1 in 1), insoluble, or only very slightly soluble, in alcohol. It gives off all its water of crystallisation at  $100^\circ$  and melts at  $204^\circ$ ; at  $235^\circ$  it gives off the elements of water, leaving a residue of sodium metaphosphate. The aqueous solution yields with solution of silver nitrate a yellow precipitate; the precipitation, however, is incomplete, as the nitric acid formed at the same time dissolves a portion of the silver phosphate. The salt contains 13·04 per cent. of water of crystallisation.

Sodium diphosphate is employed to render the urine acid in cystitis and after operations on the bladder. Small, repeated doses are preferred as less likely to set up diarrhoea, whilst procuring a continuous excretion of the acid salt. It is best given in dilute, aqueous solution. It is the most effective drug we possess for rendering the urine acid.

*Dose.*—30 to 60 grains (2 to 4 grammes).

**SODII ETHYLAS.**

SODIUM ETHYLATE.

*Synonyms.*—Sodium Ethoxide; Caustic Alcohol.

Sodium ethylate,  $\text{NaC}_2\text{H}_5\text{O}$ , may be prepared by adding gradually, in small pieces, 12 of bright metallic sodium to 100 of absolute alcohol. The reaction is best performed in a flask immersed in cold water and provided with a long, open tube to act as a reflux condenser, thus allowing the hydrogen evolved to escape and the condensed alcohol vapour to run back. When the evolution of hydrogen on addition of sodium ceases, the thick liquid in the flask, after removal of any undissolved sodium, is poured into a porcelain dish and evaporated over a water-bath until a small portion taken out and cooled forms a solid mass. The mass, after cooling, is powdered, and at once placed in a well-stoppered, glass vessel. Prepared in this way, it is a mixture of alcoholic sodium ethylate and alcohol-free salt. By heating to  $200^\circ$  the alcohol is driven off, and pure sodium ethylate remains as an amorphous residue.

It occurs as a pale reddish-yellow powder, later becoming darker in colour, brownish or greyish, having an alcoholic odour and a caustic taste; hygroscopic, gradually decomposing in contact with moisture. Soluble in water, with decomposition; also in alcohol, with decomposition if water be present. On being strongly heated it becomes charred. With chloroform it forms an explosive mixture. It dissolves in water with a hissing noise, and the solution when heated yields ethylic alcohol, and on evaporation leaves a solid, white residue of sodium hydroxide.

Sodium ethylate is rarely employed in medicine, and its solution in absolute alcohol is inferior as a caustic to freshly-made *Liquor Sodii Ethylatis*.

**SODII FLUORIDUM.**

SODIUM FLUORIDE.



Sodium fluoride,  $\text{NaF}$ , is prepared technically by fusing sodium silico-fluoride with sodium carbonate, lixiviating and evaporating the solution, or by boiling cryolite ( $3\text{NaFAlF}_6$ ) with solution of sodium hydroxide of at least 1.350 specific gravity, whereby sodium fluoride separates as a crystalline powder. The pure salt, however, may be prepared by neutralising a solution of hydrofluoric acid with a solution of sodium carbonate or sodium hydroxide in a platinum dish, evaporating the solution to dryness, exposing the residue to a strong heat for some time, and allowing to cool.

It occurs in the form of clear, lustrous cubes, or as a white, crystalline powder, anhydrous, and having a saline taste. Soluble in cold water (1 in 25), scarcely more soluble in hot water, insoluble in alcohol. The aqueous solution has an alkaline reaction, and attacks



glass. On heating, the salt decrepitates, and at a higher temperature melts without decomposition. On heating with concentrated sulphuric acid vapours of hydrofluoric acid are given off which etch glass. The salt itself attacks glass, and should therefore be kept in rubber bottles, or glass bottles lined with hard paraffin. It is partially decomposed to sodium chloride on heating with ammonium chloride, and on fusing with magnesium chloride produces sodium chloride and magnesium fluoride. It combines with sodium borate to form sodium fluoborate ( $6\text{NaFNa}_2\text{B}_2\text{O}_4$ ).

Sodium fluoride is used technically to prevent lactic and butyric fermentation in the manufacture of alcohol, 10 to 15 grammes being added to 1000 litres of mash. It is said to definitely arrest vital fermentations (due to development of living organisms) in the proportion of 1 per cent., but to have no disturbing action on chemical fermentations, such as diastasic action. As it does not coagulate albumen, bacteria are not protected from its action by a coating of albumen. Hypodermically it may be used as a solution of 1 in 200 at which strength it has no caustic action.

The fluorides have an extremely powerful local irritant action. Taken by the mouth they are absorbed only in the merest traces, and, except in very dilute solutions, give rise to nausea and vomiting. They are general protoplasmic poisons, a 0.5 per cent. solution destroying most bacteria. Sodium fluoride has been given internally and by hypodermic injection in phthisis, also in rickets and enlarged spleen; it should be dispensed in mixture form in very dilute solution. It is incompatible with acids.

*Dose.*—5 to 10 milligrams ( $\frac{1}{12}$  to  $\frac{1}{8}$  grain).

NOTE.—Sodium fluoride is also known under the trade-name Fluorol.

## SODII FORMAS.

### SODIUM FORMATE.



Sodium formate,  $\text{NaCHO}_2, \text{H}_2\text{O}$ , may be prepared by neutralising formic acid with pure sodium carbonate or bicarbonate, evaporating and crystallising.

It occurs in the form of colourless rhombic plates or flat, four-sided prisms, or as a white, crystalline powder; inodorous, deliquescent in moist air, and having a bitter, saline taste. Soluble in water (1 in 2), also in glycerin. On heating, the salt melts in its water of crystallisation, which it gives off with strong intumescence, afterwards solidifying to a pearly, anhydrous mass; the anhydrous salt melts at  $200^\circ$ ; it yields no acid distillate when strongly heated, but is decomposed into hydrogen and the oxalate. When heated with strong sulphuric acid it evolves carbon monoxide, which burns with a characteristic, blue flame when ignited. Heated with excess of baryta it yields the oxalate. Its aqueous solution readily reduces many metallic salts on boiling, and yields a red colour with solution of

ferric chloride. The dry salt may be used as a reducing agent in blowpipe experiments.

Formic acid and the formates have been stated to exert a specific action upon striped and unstriped muscle tissue, increasing muscular energy and warding off fatigue, giving tone to the muscles and restraining muscular tremor in paralysis agitans, chorea, etc. The evidence so far given for these assertions is quite unreliable, and there is no reason to suppose that the formates act intrinsically different from the acetates. It undergoes oxidation in the body to carbonate, but rather more is excreted unchanged in the urine, as formate, than is the case with acetates. They have also been recommended for internal use, as antiseptics, in tuberculosis and pneumonia. They exert a marked diuretic action, and otherwise resemble the acetates.

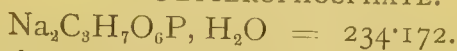
Sodium formate is used in association with the potassium or iron salts as a general muscular "tonic." It may be given in mixture form, or as Elixir Formatum, and is often combined with the hypophosphites or glycerophosphates.

*Dose*.—6 to 30 decigrams (10 to 45 grains).

NOTES.—Sodium acid formate,  $\text{NaCHO}_2 \cdot \text{CH}_2\text{O}_2$ , is prepared like the corresponding potassium salt; large quantities of water decompose it, with formation of formic acid and the neutral salt.

## SODII GLYCEROPHOSPHAS.

SODIUM GLYCEROPHOSPHATE.



Sodium glycerophosphate,  $\text{Na}_2\text{C}_3\text{H}_7\text{O}_6\text{P}$ ,  $\text{H}_2\text{O}$ , may be prepared by mutual decomposition between a solution of barium or calcium glycerophosphate and a solution of sodium carbonate or sulphate; also by neutralising an aqueous solution of glycerophosphoric acid with a solution of sodium carbonate, filtering and concentrating the solution *in vacuo*.

It occurs in the form of crystalline masses, and also in solutions of the strength of 75 per cent. and 50 per cent., forming yellow, tenacious liquids, which in the cold thicken from separation of crystals, becoming clear again on gently warming. Soluble in water in all proportions.

Sodium glycerophosphate is employed usually in association with other glycerophosphates in the form of syrup or elixir as a "nerve tonic" in all kinds of wasting and nervous diseases (see Acidum Glycerophosphoricum).

*Dose*.—3 to 6 decigrams (5 to 10 grains).

## SODII HIPPURAS.

SODIUM HIPPURATE.



Sodium hippurate,  $2\text{NaC}_9\text{H}_8\text{NO}_3$ ,  $\text{H}_2\text{O}$ , may be prepared by careful neutralisation of a solution of sodium carbonate by a solution of

hippuric acid in hot water, evaporating the resulting solution to dryness, dissolving the residue in alcohol and crystallising therefrom several times.

It occurs in the form of a slightly yellow mass with a distinctly crystalline structure, or as a greyish-white, amorphous powder, odourless, and having a faint, alkaline taste. Very soluble in water and in alcohol; sparingly soluble in ether. The aqueous solution gives a cream-coloured precipitate with solution of ferric chloride; with silver nitrate and mercurous nitrate, white curdy precipitates. Mineral acids decompose the salt with separation of hippuric acid in a crystalline state. When fused with excess of potassium hydroxide or lime it gives off ammonia, and yields benzene by distillation.

Sodium hippurate has been recommended for use as a solvent of uric acid in gout and rheumatism and to lower blood pressure in arterio-sclerosis, but is probably without either of these actions. It may be administered in mixture form or enclosed in a cachet. Sodium benzoate is converted in the body to sodium hippurate, and is excreted in that form, which is much less toxic.

*Dose.*—3 to 20 decigrams (5 to 30 grains).

## SODII HYDROXIDUM.

SODIUM HYDROXIDE.

$\text{NaOH} = 40.058$ .

*Synonyms.*—Soda Caustica; Caustic Soda; Sodium Hydrate.

Sodium hydroxide,  $\text{NaOH}$ , may be prepared by the same methods as described under Potassa Caustica. It occurs in commerce in several forms: (1) Lumps formed by evaporating the clear solution to dryness, fusing, allowing to solidify, and breaking up. (2) Powder or granules, obtained by disintegrating the lumps to the desired degree. (3) Sticks formed by pouring the fused mass into suitable moulds. (4) Alcohol-purified, prepared by dissolving ordinary caustic soda in about four times its weight of 95 per cent. alcohol, allowing the solution to stand for several days and pouring off the supernatant alcoholic solution from the aqueous layer which collects at the bottom of the vessel and contains the impurities. The alcohol is then recovered from the solution and the purified caustic soda fused into the form required. (5) From metallic sodium, pure metal sodium being added in small pieces to distilled water in a silver basin and evaporated rapidly. This last is the purest form of the salt. Large quantities of caustic soda, however, are now made electrolytically from pure sodium chloride.

The masses of caustic soda are hard, white, and opaque, strongly alkaline in reaction, highly corrosive, and of intensely acrid and caustic taste. The sticks when freshly fractured show a crystalline structure. On exposure it absorbs moisture and liquefies, but subsequently becomes solid again and effloresces in consequence of the absorption of carbon dioxide with formation of sodium carbonate



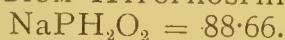
and efflorescence of the latter. Soluble readily in water; in boiling water (1 in 0·8); very soluble in alcohol. Heated to about 525°, it melts to a clear, oily liquid, and at a bright red heat slowly volatilises unchanged. The aqueous solution should be perfectly clear and colourless (absence of organic matter), and after being acidified with acetic acid should yield no precipitate with excess of tartaric acid (limit of potassium). It should be free from arsenium, copper, lead, silica, etc. On adding slight excess of diluted sulphuric acid to 10 mls of a 10 per cent. aqueous solution no distinct effervescence should occur (limit of carbonate). Commercial specimens sometimes contain sodium aluminate, which is soluble in water but insoluble in alcohol; on treating with excess of ammonium chloride it will separate as a white, gelatinous precipitate; this dissolves with excess of hydrochloric acid. A concentrated, aqueous solution, exposed to a temperature of 10° or less, separates thick tabular crystals of the hydrate  $2\text{NaOH} \cdot 7\text{H}_2\text{O}$ , which melt above 6°.

Sodium hydroxide has properties which closely resemble those of potassium hydroxide.

NOTES.—*Pasta Londinensis* is made by mixing equal weights of sodium hydroxide and unslaked lime in powder, adding sufficient water to make a paste when required for use. It is applied as a caustic to ulcers and malignant growths.

## SODII HYPOPHOSPHIS.

### SODIUM HYPOPHOSPHITE.



Sodium hypophosphite,  $\text{NaPH}_2\text{O}_2$ , may be obtained by the interaction of sodium carbonate and calcium hypophosphite, with subsequent filtration, and careful evaporation of the filtrate to dryness at a low temperature. If allowed to crystallise from water, or alcohol containing water, it has the formula  $\text{NaPH}_2\text{O}_2 \cdot \text{H}_2\text{O}$ .

The anhydrous salt occurs as a white, granular powder, deliquescent., odourless, and having a bitter, nauseous taste. Soluble in water (1 in 1), in alcohol (1 in 20), in glycerin (1 in 2), insoluble in ether. The aqueous solution is neutral or slightly alkaline to litmus. On heating to about 200° it is decomposed with evolution of spontaneously inflammable hydrogen phosphide. It is very liable to explode when mixed with nitrates, chlorates, or other oxidising agents. If 5 decigrams be boiled for ten minutes with 25 mls of water and  $11\frac{1}{2}$  decigrams of potassium permanganate, and filtered, it should afford a nearly colourless solution, indicating 96·16 per cent. of sodium hypophosphite. A more accurate method of determination is to free from impurities by means of lead acetate, oxidise by means of potassium chlorate and hydrochloric acid, and finally determine the phosphate formed by the usual gravimetric or volumetric methods. Sodium hypophosphite should be free from lead, arsenium, copper, iron, aluminium, zinc, calcium, magnesium, potassium, ammonium, chlorides, or sulphates, and practically free from carbonates, phosphates, and phosphites.

Sodium hypophosphite resembles the hypophosphites of calcium and potassium in its action, and is usually prescribed therewith (see Acidum Hypophosphorosum and Calcii Hypophosphis). A syrup of sodium hypophosphite is prepared, and contains 1 grain of the salt in each fluid drachm.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

### SODII IODAS.

SODIUM IODATE.

$\text{NaIO}_3 = 198.02.$

Sodium iodate,  $\text{NaIO}_3$ , may be prepared by saturating with chlorine 10 parts of water in which 1 part of iodine is suspended, neutralising with sodium carbonate, repeating the saturation with chlorine and neutralisation with sodium carbonate, and finally evaporating the solution to one-tenth of its volume, and mixing it while still warm with half of its volume of alcohol. The compact crystalline mass which separates on cooling is pressed and freed from adhering sodium chloride by washing with alcohol or by recrystallisation. It may also be prepared by neutralising iodic acid with sodium carbonate, or obtained as a by-product in the manufacture of sodium iodide from iodine and sodium hydroxide.

It occurs in the form of rhombic, bipyramidal crystals or as a white, crystalline powder; odourless. Soluble in cold water (about 1 in 20), in boiling water (1 in 3), insoluble in alcohol. The addition of glycerin or absolute alcohol to the concentrated, aqueous solution causes separation of the salt in the form of small crystals. It melts when heated, and while still below redness gives off its oxygen (24 to 25 per cent.) together with iodine. It resembles chlorates in its oxidising action upon combustible bodies. Thrown on glowing charcoal it detonates, and slightly also when mixed with sulphur, and struck. Mixed with concentrated hydrochloric acid chlorine is evolved.

The iodates are considerably more poisonous than the chlorates, the relative toxicity bearing some relation to their oxidising powers in solution. Sodium iodate is a powerful antiseptic, resembling calcium iodate in its properties (see Calcii Iodas). It is given internally as a substitute for the iodides in bronchial asthma, and a 5 per cent. solution is injected hypodermically for acute and chronic articular rheumatism. Externally it is used as an antiseptic lotion in 1 to 3 per cent. solution, or as a 2 per cent. ointment with soft paraffin. It is used as a dusting powder mixed with eight times its weight of boric acid.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

### SODII IODIDUM.

SODIUM IODIDE.

$\text{NaI} = 150.02.$

Sodium iodide,  $\text{NaI}$ , may be prepared by a process similar to that employed in making potassium bromide, or by combining 2 parts of

iron and 5 parts of iodine in the presence of water, and precipitating the resulting solution of ferroso-ferric iodide with solution of sodium carbonate, boiling the mixture, filtering, and evaporating the solution to dryness with constant stirring. If crystallised at a temperature below  $68^{\circ}$  the hydrated salt  $\text{NaI}, 2\text{H}_2\text{O}$  is obtained.

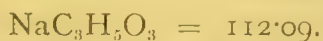
It occurs in the form of colourless, cubical crystals, or as a white, granular, crystalline powder, odourless, anhydrous, hygroscopic, and having a somewhat bitter, saline taste. If exposed to moist air it readily deliquesces, and is then liable to decomposition, becoming yellow in colour from liberation of iodine. Soluble in water (1 in 0.55), in alcohol (1 in 3), in glycerin (1 in 1). The aqueous solution is slightly alkaline to litmus paper, and gradually becomes coloured from liberation of free iodine on exposure to light and air. It melts at a dull red heat, and when fused evolves a little iodine; at a higher temperature it slowly volatilises. On cooling the fused substance it solidifies to a pearly, crystalline mass. The salt should not lose more than 5 per cent. of moisture at  $120^{\circ}$ ; commercial samples frequently contain as much as 10 to 20 per cent. of water. On dissolving 1 gramme in water, and adding 1 decimil of decinormal solution of sulphuric acid, no red colouration should be produced on the addition of a drop of solution of phenol-phthalein, even after heating (limit of alkali). The addition of 1 decimil of diluted sulphuric acid to 10 mils of a 5 per cent. aqueous solution should not cause a yellow colouration within half a minute (limit of iodate). On dissolving in sufficient water to make a strong solution considerable heat is developed, due to chemical combination between the anhydrous salt and water; a similar solution of potassium iodide produces a marked reduction in temperature. Titration with volumetric solution of silver nitrate should indicate a purity of at least 98.94 per cent. It should be free from lead, copper, arsenium, iron, aluminium, calcium, magnesium, potassium, ammonium, bromates, cyanides, carbonates, or iodates, and should not show more than the slightest traces of bromides, chlorides, or sulphates.

The properties of sodium iodide closely resemble those of potassium iodide; it is, however, considered to be less irritant to the stomach and less depressant (see *Potassii Iodidum*). Sodium iodide is incompatible with *Spiritus Ætheris Nitrosi* (unless in alkaline mixture), strychnine, ferric salts, and bismuth salts.

*Dose*.—3 to 12 decigrams (5 to 20 grains).

### SODII LACTAS.

SODIUM LACTATE.



Sodium lactate,  $\text{CH}_3\text{CH}(\text{OH})\text{COONa}$ , may be prepared by heating 100 of lactic acid (75 per cent.) and 100 of water on a water-bath, and adding a filtered solution of 115 to 118 of crystallised sodium carbonate until the liquid is slightly alkaline in



reaction. The solution is evaporated on a water-bath until aqueous vapours are no longer evolved. Commercially it is prepared by mixing dried calcium lactate with sodium bicarbonate, adding water little by little, and boiling. After cooling, the mixture is shaken with alcohol and allowed to stand for a day, when it is filtered; the alcohol is recovered and the residual solution evaporated until aqueous vapours are no longer given off. It can be brought to a dry mass by continued evaporation on a water-bath, but it is then so extremely hygroscopic that its storage in the solid form is practically impossible.

It occurs as a colourless or yellowish, thick, syrupy liquid, neutral or only slightly alkaline, and having a mild, saline taste. Very soluble in water and in alcohol; insoluble in ether. The alcoholic solution is precipitated by ether. Treated with tartaric acid it should not evolve the odour of acetic acid on gently warming; and the aqueous solution should not have any reducing action on ammoniacal solution of silver nitrate (absence of reducing sugars). If 2 grammes be mixed with 3 grammes of zinc sulphate, warmed on a water-bath and shaken with a mixture of 10 parts of absolute alcohol and 5 parts of ether, the ethereal liquid should leave no residue on evaporation (absence of glycerin). Any effervescence with acids would indicate the presence of sodium carbonate, of which there is frequently much present in commercial samples.

The lactates resemble the acetates in being almost entirely inactive except for their salt action. They are more slowly absorbed, and are only partly oxidised in the tissues, some lactic acid being excreted in the urine. In full doses sodium lactate has been stated to limit nitrogenous waste, and to possess hypnotic properties. It is sometimes given well diluted in diabetes.

*Dose.*— $\frac{1}{4}$  to 2 grammes (4 to 30 grains), or more.

## SODII METHARSENIS.

SODIUM METHARSENITE.



*Synonyms.*—Methyl Disodium Arsiniate; Disodium Methyl-arsinate.

Sodium metharsenite,  $\text{CH}_3\text{AsO}_3\text{Na}_2, 6\text{H}_2\text{O}$ , is the sodium salt of methyl-arsenious acid, an organic derivative of arsenic. It may be prepared by the action of methyl iodide on sodium arsenite in presence of excess of sodium hydroxide. The compound contains 25.6 per cent. of metallic arsenium, equivalent to 33.79 per cent. of arsenious anhydride.

It occurs in the form of bulky, transparent, colourless crystals. Easily soluble in water (about 1 in 1), slightly soluble in alcohol (about 1 in 150), insoluble in ether, benzol, petroleum ether, and oils. Melting-point,  $130^\circ$  to  $140^\circ$ . Being very closely related to sodium cacodylate, it is necessary that the means

of distinguishing the two compounds should be noted. Sodium metharsenite is alkaline to litmus, gives a white precipitate with silver nitrate, lead acetate, and mercuric nitrate, and a violet precipitate with cobalt nitrate; sodium cacodylate is neutral to litmus, gives no precipitate with silver nitrate, lead acetate, or cobalt nitrate, and a white precipitate turning yellow with mercuric nitrate. The following test is said to be specially delicate:—Sodium metharsenite is not precipitated by calcium chloride in the cold, but on warming a white precipitate is thrown down; sodium cacodylate, on the other hand, gives no precipitate even on warming. To detect the presence of cacodylates in methyl arsenites dissolve 2 decigrams of the salt in 1 to 2 mls of water, and add the solution to 10 mls of a reagent prepared by dissolving 20 of sodium hypophosphite in 20 of distilled water, and adding the solution to 200 by volume of hydrochloric acid. The mixture is set aside, corked, for twelve hours, when, if only 0.5 milligram of cacodylate be present, a marked odour of cacodyl will be evident. Pure methyl arsenites under these conditions give off no odour. The purity of the salt may be determined by precipitating with excess of decinormal silver nitrate solution, then titrating back the excess of silver nitrate in an aliquot part of the supernatant liquid by Volhardt's method (see Notes). One molecule of the salt is equivalent to two molecules of silver nitrate. In aqueous solution it forms precipitates with solution of salts of alkaloids. The precipitate is due to double decomposition taking place, and alkaloidal methyl arsenites formed, which are definite, crystalline compounds.

Sodium metharsinate is a comparatively non-toxic preparation of arsenic. It resembles the cacodylates in that the arsenic is in combination with the carbon atom. The physiologically active arsenic ions are not present in solutions of this salt, and any activity it possesses arises from its partial decomposition in the tissues with liberation of arsenic in the ionic form. It offers the advantage over the cacodylates of not giving rise in the body to cacodyl with its nauseous garlic odour. It is employed in tuberculosis, chlorosis, and anæmia; also in malarial fever and the anæmias resulting therefrom, syphilis and chronic skin affections. It may be given in the form of elixir; 30 milligrams ( $\frac{1}{2}$  grain) being dissolved in 4 mls (1 fluid drachm) of elixir of orange for a dose. Pills are prepared by triturating with sugar of milk and massing with glucose. The best results have, however, been obtained by hypodermic administration; 30 milligrams ( $\frac{1}{2}$  grain) dissolved in 1 ml (15 minims) of sterile distilled water forms a daily dose. It is usually administered for a period of five to seven successive days, when it is discontinued for a similar period.

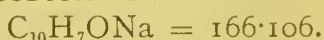
*Dose.*—3 to 12 centigrammes ( $\frac{1}{2}$  to 2 grains).

*NOTES.*—Sodium metharsenite is also known under the trade-names Arrhenal and Arsinyll. Volhardt's method is as follows:—Dissolve 10 grammes of pure crystals of potassium thiocyanate in 1000 mls of water. Into a flask place 10 mls of decinormal silver nitrate solution, with 3 mls of a 10 per cent. solution

of ferric ammonium sulphate, and 3 mls of pure nitric acid, and dilute the liquid with about 100 mls of water. To this mixture run in from a burette, in small portions at a time, the above thiocyanate solution, shaking after each addition until the first signs of permanent reddish-brown colouration are noticed. Noting the number of mls of the thiocyanate solution used, dilute the whole of the remaining solution so that equal volumes of this and of the decinormal silver nitrate solution will be required to produce the permanent, reddish-brown tint. Repeat the process after dilution in order to ensure perfect balance between the two liquids. The difference between the amounts of silver solution originally added and that of the thiocyanate solution used indicates the amount of silver solution used up by the salt under examination.

## SODII NAPHTHOLAS.

SODIUM NAPHTHOLATE.



*Synonyms.*—Sodium-naphthol; Sodium  $\beta$ -naphtholate.

Sodium naphtholate,  $\text{NaC}_{10}\text{H}_7\text{O}$ , may be prepared by fusing beta-naphthol with one-fourth its weight of sodium hydroxide, cooling, and powdering the mass; or by dissolving 15 of  $\beta$ -naphthol in a concentrated solution of 4 of sodium hydroxide free from carbon dioxide, evaporating the solution to dryness as quickly, and with as little exposure to air, as possible.

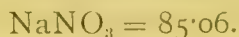
It occurs as a white or greyish-white powder, tasteless and odourless, and quickly changing under the influence of light and air; it is very feebly toxic, but more powerfully antiseptic than phenol. It consists of 75 per cent. of sodium naphtholate and 25 per cent. of mixed naphthol and phenol compounds, and is soluble in water (1 in 3). The aqueous solution is non-caustic, and does not affect surgical instruments. The concentrated solutions are brownish in colour; the diluted, nearly colourless. Aqueous solutions yield a precipitate of  $\beta$ -naphthol on the addition of acids.

Sodium naphtholate is used in the form of solutions (1 in 200 to 300) for lotions and dressings.

NOTES.—Sodium naphtholate is also known under the trade-name Microcidin. It should be protected from light and air.

## SODII NITRAS.

SODIUM NITRATE.



Sodium nitrate occurs naturally in immense quantities in Chili and Peru; it may be prepared by neutralising nitric acid with sodium carbonate, bicarbonate, or hydroxide, and crystallising the resulting solution.

It occurs in the form of colourless, transparent, rhombohedral crystals, odourless, and having a cooling, saline, slightly bitter taste; hygroscopic in moist air. Soluble in cold water; in boiling water (1 in 0.6); in boiling alcohol (1 in 40). The aqueous solution is neutral to litmus paper. On heating to  $312^\circ$  it melts without decom-



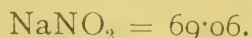
position; at a higher temperature it decomposes with evolution of oxygen and reduction to nitrite, heated with charcoal it deflagrates. When the aqueous solution is treated with a little solution of diphenylamine and then with concentrated sulphuric acid to form a layer, a deep blue colouration will appear at the junction of the two layers. On adding 1 mil of chloroform to 10 mils of a 5 per cent. aqueous solution, and then 1 mil of chlorine, drop by drop, with agitation, the chloroform should remain free from violet-tint (absence of iodide). It should be free from more than traces of the heavy metals, and should contain not less than 99 per cent. of pure sodium nitrate.

Sodium nitrate resembles potassium nitrate in its action, but is rarely used in medicine.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

### SODII NITRIS.

SODIUM NITRITE.



Sodium nitrite,  $\text{NaNO}_2$ , may be prepared by fusing sodium nitrate with metallic lead or other reducing agent. Lead in small fragments is generally employed, when the fused salt is poured off from the separated lead oxide which has been formed, dissolved in water, and the sodium nitrite allowed to crystallise.

It occurs as a white, or faintly yellowish, granular, crystalline powder, or as fused sticks or pencils with a crystalline fracture, deliquescent, odourless, and having a mild, saline taste. Soluble in water (1 in 1.2), in alcohol (1 in 50). The aqueous solution is colourless, and neutral or faintly alkaline in reaction. On heating, the salt melts, and at a red heat is decomposed with formation of sodium oxide, nitrogen dioxide, oxygen, and nitrogen. Treated in a brine-charged nitrometer with potassium iodide and diluted sulphuric acid, a volume of nitric oxide indicating not less than 94.5 per cent. of sodium nitrite should be evolved. It may also be determined by titration with decinormal solution of potassium permanganate. The aqueous solution should not give more than the slightest trace of precipitate on the addition of diluted sulphuric acid (absence of lead).

Sodium nitrite has the characteristic properties of the nitrites, closely resembling nitroglycerin in its action; the effect comes on rather more slowly than with the latter drug, but extends over a longer period. It is used especially in angina pectoris and asthma, to ward off attacks and to relieve the symptoms during an attack, also to lessen arterial tension in renal disease. It is best given in aqueous solution in mixture form. The nitrous acid formed from it may induce gastro-intestinal irritation. It is mostly excreted as nitrate in the urine. Sodium nitrite is incompatible with oxidising agents.

*Dose.*—6 to 30 centigrams (1 to 5 grains).

**SODII PEROXIDUM.**

SODIUM PEROXIDE.

*Synonym.*—Sodium Dioxide.

Sodium peroxide,  $\text{Na}_2\text{O}_2$ , may be prepared by placing metallic sodium in slices on aluminium trays in an iron tube, through which is passing a current of air, freed from moisture and carbon dioxide, the temperature of the tube being kept at about  $400^\circ$ .

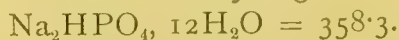
It occurs in the form of a white, amorphous powder, frequently containing small particles of metallic sodium. Very soluble in water, dissolving with a hissing noise, evolution of heat and formation of sodium hydroxide and hydrogen peroxide; from the solution, oxygen is given off slowly in the cold, more quickly on heating. On the application of heat it becomes yellow, then melts, but not so easily as sodium hydroxide, and does not decompose; on cooling, the mass becomes white again. It has no action on alcohol, but inflames ether in contact with it. A mixture with red phosphorus explodes on pressure, or on being struck. It is an extremely powerful oxidising agent, and is used chiefly in bleaching, liberating hydrogen peroxide when added to ice-cold, diluted mineral acids. For many operations, however, it is frequently mixed with magnesium salts, which cause formation of magnesium peroxide, the sodium salt itself attacking animal fibres on account of its strong alkalinity.

The properties of sodium peroxide resemble those of calcium and magnesium peroxide. It is, however, not used internally, but has been used externally in acne in the form of a paste prepared with liquid paraffin, or as a medicated soap (10 to 20 per cent.), to remove comedones.

NOTES.—Hydrated sodium peroxide,  $\text{Na}_2\text{O}_2 \cdot 8\text{H}_2\text{O}$ , has been obtained as large, hexagonal, tabular crystals by allowing an aqueous solution of sodium peroxide to stand over sulphuric acid. The same hydrate may be obtained by adding a solution of hydrogen peroxide to a solution of sodium hydroxide, and precipitating by alcohol. Sodium peroxide in contact with carbon monoxide forms sodium carbonate; with carbon dioxide the same salt is formed, and the atom of oxygen liberated.

**SODII PHOSPHAS.**

SODIUM PHOSPHATE.

*Synonym.*—Disodium Hydrogen Phosphate.

Sodium phosphate,  $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ , may be obtained by the interaction of sodium carbonate, and the solution of acid calcium phosphate produced on mixing bone-ash and sulphuric acid, crystallisation being effected at a temperature below  $35^\circ$ .

It occurs in large, colourless, transparent, rhombic prisms, which are efflorescent in the air, gradually losing five molecules of their water of crystallisation; it is odourless, and has a cooling saline taste. Soluble in cold water (1 in 6), more soluble in hot water, insoluble in alcohol. The aqueous solution has a slightly alkaline

reaction. Heated to  $40^{\circ}$  the salt fuses, yielding a colourless liquid. At  $100^{\circ}$  it loses all its water of crystallisation, and at a red heat it is converted into sodium pyrophosphate, losing 62.84 per cent. of its weight. It should be free from arsenium, potassium, ammonium, carbonates, and nitrates, and should contain not more than traces of chlorides or sulphates.

Sodium phosphate is a saline cathartic, resembling in its mode of action other salines of a similar nature (see *Magnesii Sulphas* and *Sodii Sulphas*). It was formerly regarded as a hepatic stimulant in biliousness and jaundice, but its only action is that of a saline cathartic. Owing to its comparative tastelessness it is much used as an aperient for children, and also in some forms of children's diarrhœa. It may be given in milk or soup or mixed with food. Like other saline cathartics, it has a mild diuretic action and is used as an "antilithic" in gout. It has also been given in various disorders of nutrition, such as rickets and osteomalakia, to supply a supposed deficiency of phosphates in the food. It has also been recommended in exophthalmic goitre and in various nervous diseases. Sodium phosphate is given in solution in mixture form or as *Sodii Phosphas Effervescens*. The dried salt (see Notes) may be mixed with other powders and dispensed in bulk or in weighed powders.

*Dose*.—2 to 8 grammes (30 to 120 grains) for repeated administration; for a single administration 7 to 14 grammes ( $\frac{1}{4}$  to  $\frac{1}{2}$  an ounce).

NOTES.—*Sodii Phosphas Exsiccatus*, U.S.P., is prepared by allowing the crystals of sodium phosphate to effloresce for several days in warm air, at a temperature of  $25^{\circ}$  to  $30^{\circ}$  C., and further drying in an oven, gradually raising the temperature to  $100^{\circ}$ , and maintaining it at that point until the salt ceases to lose weight. The residue is powdered, sifted, and preserved in well-stoppered bottles. *Sodii Phosphas Exsiccatus* is an odourless white powder, suitable for mixing with bicarbonate of soda and other powders; one part of the dried salt is approximately equal to 2 parts of the crystalline salt. The average dose of exsiccated sodium phosphate is 1 gramme (15 grains). Solution of sodium phosphate is a 10 per cent. w/v aqueous solution of the crystalline salt.

## SODII PHOSPHAS EFFERVESCENS.

### EFFERVESCENT SODIUM PHOSPHATE.

Sodium Phosphate, in crystals ...	...	...	50.00
Sodium Bicarbonate, in powder ...	...	...	50.00
Tartaric Acid, in powder ...	...	...	27.00
Citric Acid, in powder ...	...	...	18.00

Powder the sodium phosphate, previously dried until it has lost 60 per cent. of its weight; mix with the other powders, and granulate as directed in the case of *Caffeinæ Citras Effervescens*. The resulting product should weigh about 100.

*Dose*.—4 to 8 grammes (60 to 120 grains) for repeated administration; for a single administration, 7 to 14 grammes ( $\frac{1}{4}$  to  $\frac{1}{2}$  an ounce).

NOTE.—*Sodii Phosphas Effervescens*, U.S.P., is prepared by mixing 20 of exsiccated sodium phosphate with 16.2 of citric acid, 25.2 of tartaric acid, and 47.7 of sodium bicarbonate.



**SODII PYROPHOSPHAS.**

SODIUM PYROPHOSPHATE.



Sodium pyrophosphate may be prepared by exposing crystallised sodium phosphate to warm, dry air until it has effloresced, and then heating the residue to dull redness until it ceases to give a perceptibly yellow precipitate with silver nitrate. The residue is then dissolved in boiling water, filtered, and crystallised.

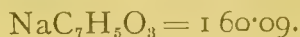
It occurs in the form of colourless, transparent, monoclinic prisms, or as a crystalline powder, odourless, and having a cooling, saline, and feebly alkaline taste; slightly efflorescent in warm air. Soluble in boiling water (1 in 1.1); insoluble in alcohol. On heating to 100° it loses its water of crystallisation (40.35 per cent.) without previously fusing; at a higher temperature it melts to a transparent liquid, which solidifies on cooling to a crystalline mass. The aqueous solution is slightly alkaline to litmus and phenolphthalein. With solution of silver nitrate it gives a white precipitate (distinction from orthophosphate), soluble in solution of ammonia; and in nitric acid without effervescence (absence of carbonate). The aqueous solution, treated with solution of ammonium molybdate in excess, gives no precipitate even on gently heating (distinction from orthophosphate). It should be free from arsenium and from more than traces of heavy metals.

Sodium pyrophosphate is not much used in medicine. It differs from ortho-phosphate in that, after injection, it has been proved to cause fatty degeneration of the liver, heart, and muscles like phosphorus. Taken by the mouth these effects are not seen because the salt is so little absorbed and that little is oxidised to normal phosphate.

*Dose.*—1 to 4 grammes (15 to <sup>6</sup>/<sub>20</sub> grains).

**SODII SALICYLAS.**

SODIUM SALICYLATE.



Sodium salicylate,  $\text{NaC}_7\text{H}_5\text{O}_3$ , may be prepared by the interaction of salicylic acid and either sodium carbonate, bicarbonate, or hydroxide, and subsequent crystallisation from alcohol.

It occurs in the form of white, pearly scales or white, amorphous powder with a slight buff or pink tinge if prepared from the "natural" acid, or as white, lustrous, pearly scales, or white, amorphous powder if prepared from the "artificial" acid. The former may have a faint odour of methyl salicylate; the latter is odourless. Both have an unpleasantly sweetish, saline taste. Soluble in water (1 in 1), in alcohol (1 in 5), in absolute alcohol (1 in 30); also soluble in glycerin. The aqueous solution is neutral or faintly acid to litmus, and when freshly made is colourless. On heating, the salt is decomposed, giving off inflammable vapours and the odour of phenol, and leaving

a white residue of sodium carbonate. The addition of ferric chloride to a weak solution of the salt produces a deep violet colour. An aqueous solution, containing not less than 1 per cent., yields, with solution of uranium nitrate, a yellowish-brown precipitate (distinction from carbolates and sulphocarbolates). When methyl alcohol is added cautiously, drop by drop, to a small quantity of the salt dissolved in concentrated sulphuric acid and the mixture boiled, the odour of methyl salicylate is evolved. Diluted mineral acids added to strong solutions of the salt produce a copious precipitate of salicylic acid. Cold, concentrated, sulphuric acid dissolves it without charring or effervescence. An aqueous solution, acidulated with nitric acid and the precipitate dissolved by addition of alcohol, should give no reaction for sulphates or chlorides. On opening a bottle in which the salt has been kept for several days the odour of phenol should not be recognisable. Free ammonia causes the aqueous solution to become brown, and alkaline solutions rapidly darken by oxidation. The melting-point of the acid is about the most important test, and should be carefully determined, and the acid should respond generally to the tests given under *Acidum Salicylicum*.

When taken internally sodium salicylate is absorbed very rapidly, circulating in the blood as such. It increases tissue break-down, and the nitrogen (urea, uric acid, etc.), sulphates, phosphates, and chlorides in the urine are all increased, but the uric acid is increased out of proportion to the urea. It exerts a marked antipyretic action; about fifteen minutes after administration dilatation of the skin vessels and some perspiration appear, followed by a fall of temperature. There is increased loss of heat so that the temperature falls in spite of the augmented metabolism. Salicylates have the power of cutting short an attack of acute rheumatism, their mode of action in this respect being unknown. They would appear to produce a specific effect, since local application of volatile salicylates (*e.g.*, methyl salicylate) to, or injection of soluble salicylates into, the affected joints affords speedy relief. The salicylates are excreted as salicyluric acid, a compound of glycocoll with salicylic acid; it is a non-toxic substance, and has none of the specific effects of the salicylates on acute rheumatism. Sodium salicylate is largely employed in acute rheumatism, and 20 grains may be given every three hours until the temperature is reduced; it is more rarely employed as an antipyretic in pneumonia, typhoid fever, and other pyrexias. It is given also in influenza, acute tonsillitis, chronic rheumatism, sciatica, and all neuralgias of rheumatic origin. It exerts some antiseptic action in the stomach and arrests gastric fermentation. It is so rapidly absorbed, however, that it is useless as an intestinal antiseptic, and a less soluble form, such as salol, is therefore preferred. Some individuals exhibit an idiosyncrasy to salicylates, but everyone is liable to certain objectionable symptoms after big doses. These are headache, noises in the ears, confusion, indistinctness of vision, excessive sweating, skin eruptions, dyspnoea

and a condition of collapse with subnormal temperature, weak pulse, and unconsciousness. Sodium salicylate is usually given in solution in mixture form, as Sodii Salicylas Effervescens, or it may be dispensed in powders or cachets; its sweet taste is best disguised with tincture of orange. When prescribed with alkaline bicarbonates or with ammonium carbonate, the solution acquires a reddish-brown colour, the rapidity of the change being inversely proportional to the purity of the salicylate and the freedom of the alkali from carbonate. With spirit of nitrous ether, sodium salicylate forms a deep reddish-brown solution; it is also incompatible with iron salts, organic and inorganic acids, and solutions of most alkaloids. Mixtures of quinine salts or the cinchona alkaloids with sodium salicylate should contain no free acid; the alkaloidal salt in powder, or the tincture or liquid extract of cinchona should be mixed with water containing one-eighth of its bulk of mucilage of acacia and the salicylate added in dilute solution.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

*NOTE.*—This salt is obtainable in four varieties, namely, powder, crystals, physiologically pure crystals, and natural.

### SODII SALICYLAS EFFERVESCENS.

#### EFFERVESCENT SODIUM SALICYLATE.

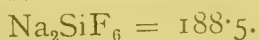
Sodium Salicylate	...	...	...	8.00
Sodium Bicarbonate, in powder	...	...	...	46.00
Tartaric Acid, in powder	...	...	...	24.00
Citric Acid, in powder	...	...	...	16.00
Refined Sugar, in powder	...	...	...	16.00

Mix and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—4 to 12 grammes (60 to 180 grains).

### SODII SILICOFLUORIDUM.

#### SODIUM SILICOFLUORIDE.



*Synonym.*—Sodium Fluosilicate.

Sodium silicofluoride,  $\text{Na}_2\text{SiF}_6$ , may be prepared by neutralising an aqueous solution of hydrofluosilicic acid with a solution of sodium carbonate; or by adding hydrofluosilicic acid to a saturated solution of pure sodium chloride, washing the gelatinous precipitate of sodium silicofluoride thus obtained with distilled water, until it no longer exhibits any chlorine reaction, and thoroughly drying.

It occurs in the form of a fine, white, granular, or crystalline powder, inodorous, non-volatile, non-deliquescent, gelatinous when moist. Slightly soluble in cold water (about 1 in 200), in boiling water (about 1 in 41), insoluble in alcohol, strong or diluted. The solubility is not increased by the addition of acids. On cooling its



boiling saturated solution the salt is deposited in small, regular hexagonal prisms. It melts at a red heat, giving off silicon tetrafluoride,  $\text{SiF}_4$ . It is used as a precipitant of potassium salts when the solutions of the latter are not too dilute. In very dilute solution (1 in 500) it is used for antiseptic purposes, in which strength it is non-caustic and non-poisonous. The salt, in concentrated solution, attacks surgical instruments and the enamel of porcelain, but not when in diluted solutions.

NOTE.—Sodium silicofluoride is also known under the trade-name Salufer.

### SODII SULPHAS.

SODIUM SULPHATE.



*Synonym.*—Glauber's Salt.

Sodium sulphate,  $\text{Na}_2\text{SO}_4, 10\text{H}_2\text{O}$ , may be obtained by the interaction of sodium chloride and other sodium salts with sulphuric acid.

It occurs in the form of large, transparent, monoclinic prisms; odourless, and having a bitter, saline taste. It effloresces rapidly in the air, finally losing all its water of crystallisation. Soluble 1 in 2.8 of water at  $15^\circ$ , in 0.3 at  $33^\circ$ , at which temperature the maximum solubility in water is attained, and above which the solubility decreases; on boiling this strong solution crystals of the anhydrous salt are deposited. At  $100^\circ$  its solubility is 1 in 0.47. Insoluble in alcohol, soluble in glycerin. The aqueous solution is neutral to litmus. Heated to  $33^\circ$  the salt fuses, and at  $100^\circ$  loses all its water of crystallisation, the loss in weight corresponding to 55.9 per cent. of the salt. The anhydrous salt fuses at a red heat without decomposition. Determined gravimetrically 99.9 per cent. of sodium sulphate should be indicated. It should be free from lead, arsenium, iron, aluminium, calcium, magnesium, potassium, ammonium, or carbonates, and should not contain more than traces of chlorides.

Sodium sulphate is, practically, not absorbed, and it therefore possesses the property, incidental to solutions of non-absorbable salts, of abstracting liquid from the tissues of the intestinal walls, and acting as a saline cathartic. The purgative action is not proportional to the endosmotic equivalent of the solution, but to the rate of absorption of the sodium and sulphate ions. Saline cathartics are best given in dilute solution (as in the natural mineral waters) unless it is desired, as in dropsical conditions, to abstract as much water from the tissues as possible, when more concentrated solutions should be used. The presence of the salts in solution promotes this abstraction, and the large bulk of liquid in the intestine sets up reflex peristalsis without producing irritation. Sodium sulphate and the other saline cathartics are much employed in habitual constipation due to deficient peristalsis, the best results being obtained by the use of dilute solutions taken early in the morning on an empty stomach. Its

action is rapid, and is unaccompanied by pain or griping. It is used to lessen intestinal putrefaction by clearing out the contents of the bowels, and is also of service in some forms of obesity. Sodium bicarbonate may usefully be given with sodium sulphate; the mixture closely resembles "Carlsbad Salts," and is of especial value in constipation associated with gouty or hepatic disorder. Sodium sulphate may be given in mixture form or as Sodii Sulphas Effervescens. The dried salt (see Notes) may be prescribed in powders, mixed with sodium bicarbonate and ginger if so desired. The powdered crystalline salt forms a damp mass with sodium bicarbonate after being mixed some hours.

*Dose.*—2 to 8 grammes (30 to 120 grains) for repeated administration; for a single administration, 7 to 14 grammes ( $\frac{1}{4}$  to  $\frac{1}{2}$  ounce).

NOTES.—This salt is obtainable in needle crystals, known as "Mock Epsom," and in delicate, thin, scaly crystals which dissolve very readily in water. An effective freezing mixture is formed by adding to the crystals half their weight of strong hydrochloric acid, the temperature produced being the same as that of a mixture of ice and salt ( $-18^{\circ}$ ). Exsiccated sodium sulphate is prepared by slowly drying the crystalline salt until its weight is reduced by one-half. Sodii Sulphas Exsiccatus is an odourless white powder. It should be prescribed for use in powders and for mixing with other salts, for which purpose the powdered crystals of sodium sulphate are not suitable; 1 part of the dried salt equals  $2\frac{1}{2}$  parts of the crystalline salt. Solution of sodium sulphate is a 10 per cent. w/v aqueous solution of the salt.

### SODII SULPHAS EFFERVESCENS.

#### EFFERVESCENT SODIUM SULPHATE.

Sodium Sulphate, in crystals	...	...	...	50.00
Sodium Bicarbonate, in powder	...	...	...	50.00
Tartaric Acid, in powder	...	...	...	27.00
Citric Acid, in powder	...	...	...	18.00

Powder the sodium sulphate, previously dried until it has lost 56 per cent. of its weight, mix with the other powders and granulate as directed in the case of Caffeinæ Citras Effervescens. The product should weigh about 100.

*Dose.*—4 to 8 grammes (60 to 120 grains) for repeated administration; for a single administration, 7 to 14 grammes ( $\frac{1}{4}$  to  $\frac{1}{2}$  ounce).

### SODII SULPHIS.

#### SODIUM SULPHITE.



Sodium sulphite,  $\text{Na}_2\text{SO}_3, 7\text{H}_2\text{O}$ , may be prepared by the interaction of sulphurous acid and sodium carbonate.

It occurs in colourless, transparent, monoclinic prisms; odourless, and having a saline, sulphurous taste. It is efflorescent in air, becoming opaque and slowly oxidised to sulphate. Soluble in water (1 in 3), in glycerin (1 in 25), insoluble in alcohol. Its aqueous solution is neutral or faintly alkaline to litmus, and is more rapidly oxidised than the salt. On boiling a cold, saturated, aqueous solution,

the anhydrous salt separates out as a crystalline powder and redissolves on cooling. On gently heating, the salt softens but does not fuse; above  $100^{\circ}$  the crystals lose their water of crystallisation (practically 50 per cent.) without melting or losing their shape; at a red heat the salt fuses into an orange-red mixture of sodium sulphide and sodium sulphate. The addition of hydrochloric acid to a solution of the pure salt disengages sulphurous anhydride, but there is no cloudiness from separation of sulphur (absence of thiosulphate); commercial samples, however, will not comply with this test. The determination of sodium sulphite is best performed by dissolving the salt in a known excess of volumetric solution of iodine and titrating back with volumetric solution of sodium thiosulphate, when not less than 97.28 per cent. of sodium sulphite should be indicated (the uneffloresced salt should be used). It should yield no reaction with the tests for arsenium.

Sodium sulphite is an antiseptic, and in the presence of free acids sulphurous acid is liberated. A solution in glycerin and water (1 in 8) is used as a paint in aphthous conditions of the mouth, and a 5 per cent. solution is used as a lotion to the skin in parasitic diseases. It is given internally in gastric fermentation, due to yeasts and *sarcinæ*, and is best administered in solution in mixture form. It is incompatible with acids. Sodium sulphite is much used as a reducing agent in the arts.

*Dose.*—3 to 12 decigrams (5 to 20 grains).

NOTES.—Commercial specimens of the salt rarely attain the official standard, as they contain on an average 5 to 6 per cent. of sulphate and moisture. An antiseptic solution known as *Liquor Sodii Sulphitis Benzoatus* is prepared by dissolving 30 of sodium sulphite and 14 of benzoic acid in sufficient distilled water to produce 500 by volume.

## SODII SULPHOCARBOLAS.

SODIUM SULPHOCARBOLATE,



*Synonyms.*—Sodii Phenolsulphonas; Sodium Phenol-sulphonate; Sodium Phenol-para-sulphonate.

Sodium sulphocarbolate,  $\text{C}_6\text{H}_4(\text{OH})\text{SO}_2\text{ONa}$ ,  $2\text{H}_2\text{O}$ , may be prepared by digesting a mixture of phenol in excess of sulphuric acid at a temperature of  $100^{\circ}$  to  $110^{\circ}$  for about six hours, and converting the para-phenol-sulphonic acid so obtained into a sodium salt.

It occurs in colourless, transparent, rhombic prisms, slightly efflorescent in dry air, odourless, and having a saline and somewhat bitter taste. Soluble in cold water (1 in 6), in boiling water (10 in 7), in cold alcohol (1 in 150), in boiling alcohol (1 in 10), in glycerin (1 in  $5\frac{1}{2}$ ). The aqueous solution is neutral to litmus. On heating to a little above  $100^{\circ}$  the salt loses all its water of crystallisation (15.5 per cent.) and becomes white. At a higher temperature it chars, giving off inflammable vapours with an odour of phenol and, finally, leaving a residue of sodium sulphate



amounting to 30.6 per cent. of the original salt. The aqueous solution gives a violet colour with ferric chloride, but no yellowish-brown precipitate with uranium nitrate, the latter test distinguishing it from salicylates. The aqueous solution gives no immediate precipitate with barium chloride (absence of sulphates), but on standing for some time partial dissociation into phenol and sodium sulphate occurs, the solution then giving a precipitate.

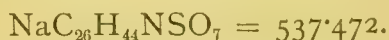
The sulphocarbolates resemble carbolic acid in their action, but are very much less poisonous. The sodium salt is employed to diminish putrefaction in the alimentary canal; it is absorbed and excreted in the urine unchanged. It is especially useful in gastric flatulence and fermentative dyspepsia, and is best given in solution in mixture form.

*Dose.*—3 to 10 decigrams (5 to 15 grains).

NOTES.—Sulphocarboic acid (para-phenol-sulphonic or sozolic acid), prepared by the action of strong sulphuric acid on carbolic acid, is a powerful antiseptic and disinfectant. A 33 per cent. solution of the acid is sold under the trade-name Aseptol, and a 3 per cent. solution is used for application to the gums. Diiodo-para-phenol-sulphonic acid is known under the trade-name Sozoiodol, and the sodium, mercury, and zinc compounds of the acid are employed as antiseptics.

## SODII TAUROCHOLAS.

### SODIUM TAUROCHOLATE.



Sodium taurocholate,  $\text{NaC}_{26}\text{H}_{44}\text{NSO}_7$ , is a natural constituent of bile, best obtained from that of the pig or ox, and may be prepared by treating dried bile with absolute alcohol, and the resulting tincture with excess of ether, which causes precipitation of both sodium taurocholate and glycocholate. The latter crystallises on standing, and may be separated from the taurocholate which remains in an amorphous, oily, or resinous state; or the mixed salts obtained as above may be dissolved in water and solution of lead acetate added, which will throw out the glycocholate as a lead compound. The taurocholate remaining in solution is precipitated by lead subacetate, the precipitate decomposed by hydrogen sulphide, and the taurocholic acid thus obtained recombined with sodium, and the compound dried at  $120^\circ$ .

It occurs in the form of a yellowish, amorphous, granular powder or as a brownish resinous mass, hygroscopic, and having a sweet, afterwards bitter taste. Soluble in water (2 in 1), and in alcohol; insoluble in ether, which precipitates the salt from its alcoholic solution in an oily or resinous condition. The aqueous solution froths when shaken, like a soap solution, and the dissolved salt is deposited on the addition of potassium hydroxide. It is not precipitated by salts of calcium, barium, magnesium, copper, or strontium, nor by neutral lead acetate, silver nitrate, or mercuric chloride; but by basic lead acetate it is precipitated in a flocculent condition, soluble in boiling water and in excess of the precipitant. With acetic acid

or diluted mineral acids there is no precipitation; ferric chloride produces a precipitate easily soluble in excess; mercurous nitrate and stannous chloride throw down white flocculent precipitates. On adding to a small quantity of an aqueous solution of the salt two-thirds of its bulk of concentrated sulphuric acid, drop by drop, and a few drops of syrup, an intense violet or purple-red colour develops. The salt contains 58.04 per cent. of carbon.

Sodium taurocholate is given in cases of supposed deficiency of biliary secretion to assist emulsification of fats and as a purgative. It is a true cholagogue, and is of service in some forms of intestinal dyspepsia, as it assists pancreatic digestion. The taurocholate is best given in "glutoid" capsules, or in pills coated with salol or keratin.

*Dose*.—1 to 4 decigrams (2 to 6 grains).

*NOTE*.—Sodium taurocholate should be kept in well-stoppered bottles in a cool place.

## SODII THIOSULPHAS.

SODIUM THIOSULPHATE.



*Synonym*.—Sodium Hyposulphite.

Sodium thiosulphate,  $\text{Na}_2\text{S}_2\text{O}_3, 5\text{H}_2\text{O}$ , may be prepared by boiling a solution of sodium sulphite with powdered roll sulphur, filtering and evaporating the solution to crystallisation; on the large scale, by exposing soda-waste, obtained during the manufacture of sodium carbonate by the Leblanc process, to air, thereby converting the calcium sulphide contained in it into calcium thiosulphate, and decomposing the latter by means of sodium carbonate or sulphate, separating the insoluble lime salt formed, and recovering the sodium thiosulphate from the solution by filtration, evaporation, and crystallisation. Gas-lime, treated in a similar way, is also used for its manufacture.

It occurs in the form of colourless, transparent, monoclinic prisms, inodorous, and having a cooling and afterwards bitter, slightly alkaline, and sulphurous taste. The crystals have a somewhat damp feeling; slightly deliquescent in moist air, and efflorescent in dry air above 33°. Soluble in water (5 in 3); insoluble in alcohol; slightly soluble in oil of turpentine. The aqueous solution is neutral or slightly alkaline to litmus paper, is very gradually decomposed in the cold into sulphur and sodium sulphite, and the concentrated solution is precipitated as an oily liquid by alcohol. On boiling the aqueous solution it is rapidly decomposed. When rapidly heated it melts in its water of crystallisation at 50°; at 100° it loses all its water of crystallisation, and at a red heat it is decomposed with liberation of sulphur, leaving a residue of sodium sulphide and sulphate. It also loses its water of crystallisation over sulphuric acid. On acidifying the aqueous solution it is decomposed into sulphurous acid and sulphur, the latter falling as a white precipitate (difference from sul-

phites). It should be free from arsenium, other metals, and sulphides, and the aqueous solution should not be coloured red by phenolphthalein (absence of alkali hydroxides or carbonates). It is extensively used in photography on account of its property of forming double salts with silver. In fixing photographic prints it acts by dissolving the unaltered portion of the sensitive film, forming soluble double salts with the silver chloride, bromide, or iodide. The salt contains 36.27 per cent. of water of crystallisation.

Sodium thiosulphate has been recommended for internal use similarly to sodium sulphite, but is much more poisonous than the latter salt, and so is rarely employed. It is applied externally for ringworm and other parasitic skin diseases in the form of lotion (1 in 8).

*Dose.*—3 to 6 decigrams (5 to 10 grains).

## SODII URAS.

### SODIUM URATE.



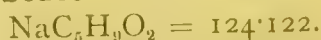
Sodium urate,  $\text{Na}_2\text{C}_5\text{H}_2\text{N}_4\text{O}_3, \text{H}_2\text{O}$ , is a neutral salt, and may be prepared by neutralising a cold diluted solution of sodium hydroxide, free from carbonate, with uric acid suspended in water, then concentrating the solution by boiling in a retort. At a certain degree of concentration the salt is deposited in a crystalline state. The solution is allowed to stand for some time, the liquid decanted, and the crystals washed with weak alcohol, and then with stronger alcohol.

It occurs in the form of hard nodules, having a crystalline structure, or as a white, granular powder. Soluble in cold water (1 in 77), in boiling water (1 in 75), very slightly soluble in alcohol. The aqueous solution absorbs carbon dioxide from the air and deposits the acid urate. Heated to  $150^\circ$  it is decomposed. The acid salt,  $\text{NaHC}_5\text{H}_2\text{N}_4\text{O}_3, \frac{1}{2}\text{H}_2\text{O}$ , is deposited in small nodules on directing a current of carbon dioxide into an aqueous solution of the neutral salt, or by adding sodium bicarbonate to a solution of uric acid in hot solution of sodium hydroxide, when the acid urate separates in crystalline form. The acid salt is soluble in cold water (1 in 1100 to 1200); in boiling water (1 in 120 to 125). It occurs naturally as an amorphous, urinary deposit, and also in gouty concretions. It is not altered by carbon dioxide, but its solution is precipitated by alkali bicarbonate as well as by salts of barium, lead, and silver.

Sodium urate is not used for medicinal purposes.

## SODII VALERIANAS.

### SODIUM VALERIANATE.



Sodium valerianate,  $(\text{CH}_3)_2\text{CHCH}_2\text{COONa}$ , may be prepared by neutralising 10 of valerianic acid with about 26 of 15 per cent. solution of sodium hydroxide, evaporating the solu-



tion to dryness, and heating the saline residue carefully on a sand-bath until it melts. The cooled mass is broken up into small fragments, and preserved in a dry, well-stoppered bottle. The valerianic acid necessary for preparing the salt may be obtained by the oxidation of amyl alcohol with potassium bichromate and sulphuric acid. It is difficult, but possible, to obtain the salt in the form of crystals by spontaneous evaporation of the neutral solution in dry air at  $32^{\circ}$ .

It occurs in the form of white, crystalline masses, hygroscopic, unctuous or soapy to the touch, having a neutral or slightly alkaline reaction, a weak odour of valerian when quite dry, more pronounced when moistened and warmed, and a sweetish taste with a somewhat bitter and pungent after-taste. Freely soluble in water and in alcohol. Heated to  $140^{\circ}$  it melts, without decomposition, to a colourless liquid, and on cooling solidifies with a crystalline structure; at a higher temperature it gives off pungent, acid vapours and inflammable gas, and on complete ignition leaves a residue of sodium carbonate (42.74 per cent.). With sulphuric acid it gives off a strong odour of valerianic acid. It should be free from heavy metals and sulphates.

Sodium valerianate resembles the other valerianates in its action, and is used for its psychical effect in hysteria and other nervous disorders. But as its odour is weak—and it is to this and its objectionable taste that its action is due—it is much inferior to the galenical preparation of valerian. Its action is, in other respects, similar to that of sodium acetate. It may be administered in pills with zinc and iron valerianates, or in solution in mixture form with ammonium valerianate or aromatic spirit of ammonia. It is incompatible with acids.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

## SODIUM.

### SODIUM.

Na = 23.05.

Sodium is a metal which is not found in nature in the free state. It is prepared on a large scale by the electrolysis of fused caustic soda or sodium chloride, and also by heating a mixture of sodium hydroxide and iron carbide to a temperature of  $800^{\circ}$  when sodium distils.

It occurs in commerce in the form of bars or cubes protected from contact with air, under mineral naphtha. It is a light, ductile, soft metal with a bright, metallic surface when freshly cut, the lustre rapidly disappearing as it becomes oxidised by the air. It is of a waxy consistence at ordinary temperatures, but at low temperatures it becomes brittle and crystalline. Specific gravity, 0.973. It melts at  $95.6^{\circ}$ , boils at  $742^{\circ}$ , and at a red heat volatilises, under proper conditions. In contact with cold water it fuses into a globule, which moves erratically over the surface of the water with a hissing noise, but does not usually take fire. If the water be warmed to

about  $60^{\circ}$ , or the sodium be placed on a piece of floating filter-paper the hydrogen evolved will burn with a bright yellow flame, sodium hydroxide remaining in solution. It attacks alcohol in a similar manner with evolution of hydrogen and formation of sodium ethoxide or ethylate. It combines with mercury to form an amalgam, and with potassium to form a liquid alloy. Heated to  $400^{\circ}$  in air freed from moisture and carbon dioxide, peroxide of sodium ( $\text{Na}_2\text{O}_2$ ) is formed. Added cautiously to water it affords a solution which, on titration with volumetric solution of sulphuric acid, should indicate not less than 97.46 per cent. of sodium.

Metallic sodium is used in the preparation of *Liquor Sodii Ethylatis*.

NOTE.—Sodium should be kept under mineral naphtha in well-stoppered bottles.

### SOLUTIO CERÆ ÆTHEREÆ.

#### ETHEREAL WAX SOLUTION.

White Beeswax ... ..	25.00
Methylated Ether (specific gravity, 0.720) ...	75.00

Dissolve the wax in the ether.

This preparation is used as a pill-coating solution.

### SOLUTIO CRESOLIS SAPONATUS.

#### CRESOL SOAP SOLUTION.

*Synonym.*—*Liquor Cresolis Glycerinatus.*

Cresylic Acid, by weight ... ..	50.00
Linseed Oil, by weight ... ..	18.00
Potassium Hydroxide ... ..	4.25
Alcohol, by weight ... ..	2.00
Glycerin, by weight ... ..	6.00
Distilled Water, sufficient to produce, by weight ... ..	100.00

Heat the linseed oil to a temperature of about  $70^{\circ}$ , add the potassium hydroxide dissolved in 24 of distilled water at the same temperature, and mix thoroughly; then add the alcohol with constant stirring, continue the application of heat without stirring until a small portion of the soap is found to dissolve in water without the separation of oily drops, add the glycerin, mix, then add the cresylic acid, and adjust the weight of the product by evaporation or the addition of distilled water.

This preparation is a powerful antiseptic and germicide, and much less toxic to animals than carbolic acid. It mixes better with water than *Liquor Cresolis Compositus*, and the emulsion formed is of a more permanent character.

NOTES.—It is important that distilled water should be employed in making this preparation, in order to prevent the formation of a deposit which must be removed by filtration; care should also be taken to avoid frothing over during the heating of the linseed oil scap.

**SOLUTIO HYDRARGYRI PERCHLORIDI ACIDA.**

## ACID MERCURIC CHLORIDE SOLUTION.

Mercuric Chloride	...	...	...	...	0·20
Hydrochloric Acid	...	...	...	...	5·00
Distilled Water, sufficient to produce...	...	...	...	...	100·00

Dissolve and tint with fuchsine.

This solution is used only as a disinfectant for excreta.

**SOLUTIO HELIANTHINÆ.**

## METHYL ORANGE SOLUTION.

Methyl Orange	...	...	...	...	0·20
Alcohol	...	...	...	...	25·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the methyl orange in the alcohol and distilled water.

This solution serves as a delicate indicator in alkalimetry, mineral acids changing the yellow liquid to pink.

NOTE.—Methyl orange (helianthine) is used as an indicator in aqueous or weak alcoholic solutions, and is comparatively unaffected by carbon dioxide, hydrogen sulphide, hydrocyanic acid, etc., but must not be used for titrating organic acids.

**SOLUTIO MAGNESII AMMONIO-SULPHATIS.**

## MAGNESIUM AMMONIO-SULPHATE SOLUTION.

*Synonym.*—Magnesia Mixture.

Magnesium Sulphate	...	...	...	...	7·50
Ammonium Chloride	...	...	...	...	15·00
Solution of Ammonia	...	...	...	...	31·50
Distilled Water	...	...	...	...	60·00

Dissolve the salts in the water, add the solution of ammonia, set the mixture aside for a few days in a well-closed bottle; then decant, and filter.

This solution is used for testing purposes.

**SOLUTIO POTASSIO-CUPRI TARTRATIS.**

## POTASSIO-CUPRIC TARTRATE SOLUTION.

*Synonym.*—Fehling's Solution.

(1) Copper Sulphate, in crystals	...	...	...	...	6·928
Sulphuric Acid	...	...	...	...	0·10
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the copper sulphate in the acid and water.

(2) Sodium Potassium Tartrate	...	...	...	...	35·20
Sodium Hydroxide	...	...	...	...	15·40
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the solids in the distilled water, and, when required for use, mix equal volumes of solutions (1) and (2).



This solution is used for detecting the presence of sugar in urine ; on boiling, 10 mls should be decolourised and reduced by 5 centigrams of glucose or diabetic sugar in solution, with precipitation of yellowish-red cuprous oxide.

NOTES.—Pavy's solution, which is also used for the detection of sugar in urine, is prepared by dissolving 17 each of sodium potassium tartrate and potassium hydroxide in a sufficient quantity of distilled water, then adding 3.465 of copper sulphate, previously dissolved in water, and making up the volume to 100 with distilled water. If 12 of this solution be mixed with 40 of strong solution of ammonia, and the mixture diluted to 100, then 10 mls of the product may be regarded as equivalent to 5 milligrams of glucose.

### SOLUTIO PLATINI CHLORIDI.

#### PLATINIC CHLORIDE SOLUTION.

Platinum Foil, of commerce	...	...	...	5.00
Hydrochloric Acid	...	...	...	30.00
Nitric Acid	...	...	...	5.00
Distilled Water, sufficient to produce	...	...	...	100.00

Add the platinum foil to the hydrochloric acid, heat to about 80°, then add the nitric acid very gradually, evaporate the liquid to dryness on a water-bath, moisten the residue with a few drops of hydrochloric acid, again evaporate to dryness, and dissolve the residue in sufficient distilled water to produce the required volume.

This solution is used for testing purposes.

### SOLUTIO POTASSIO-HYDRARGYRI IODIDI.

#### POTASSIO-MERCURIC IODIDE SOLUTION.

##### *Synonym.*—Nessler's Reagent.

Potassium Iodide	...	...	...	3.50
Mercuric Chloride, a sufficient quantity.	...	...	...	
Sodium Hydroxide	...	...	...	12.00
Distilled Water, sufficient to produce	...	...	...	100.00

Add the potassium iodide and 1.25 of mercuric chloride to 80 of distilled water, dissolve, and add to the liquid a cold, saturated, aqueous solution of mercuric chloride, stirring constantly, until a slight red precipitate remains undissolved ; dissolve the sodium hydroxide in the liquid, add a little more of the mercuric chloride solution, and make up to 100 with distilled water.

This solution is used for testing purposes, a brown precipitate of oxy-dimercuric-ammonium iodide being formed when the reagent is added to a liquid containing a small quantity of ammonia or an ammonium salt.

**SOLUTIO PHENOLPHTHALEINI.**

## PHENOL-PHTHALEIN SOLUTION.

Phenol-phthalein	...	...	...	...	0·20
Alcohol	...	...	...	...	60·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Dissolve the phenolphthalein in the alcohol and water to form a colourless liquid.

This solution is used as an indicator in alkalimetry, alkalies causing it to acquire a fine, pink colour, which is destroyed by acids, and even by carbon dioxide.

**SOLUTIO SALINA.**

## NORMAL SALINE SOLUTION.

Sodium Chloride	...	...	...	...	0·95
Water, sufficient to produce	...	...	...	...	100·00

Boil the water, cool, and dissolve the salt.

This solution is employed in large quantities for subcutaneous, intravenous, or rectal injection when the body has lost much fluid as in hæmorrhage, acute diarrhœa, etc., the injection being given at a temperature of about 40°. It is similarly employed in uræmia, diabetic coma, and other intoxications to promote excretion of poisonous substances. It is a suitable vehicle for hypodermic injections of alkaloids, etc. Normal saline solution is employed in abdominal surgery to cleanse the peritoneal cavity. It is preferably made up with tap water which has been allowed to run for some time, as this contains a trace of calcium and potassium. A still better solution, containing the requisite amount of calcium, potassium, and alkali, may be made according to the modified formula of Ringer, as follows:—Sodium chloride, 0·95; potassium chloride, 0·025; calcium chloride, 0·02; sodium bicarbonate, 0·015; water, sufficient to produce 100,00.

NOTES.—Normal saline solution has about the same osmotic equivalent as blood serum. It is usually sterilised by boiling for at least five minutes in a flask, the neck of which is plugged with sterilised cotton wool.

**SOLUTIO SALOLIS ÆTHEREA.**

## ETHEREAL SALOL SOLUTION.

*Synonym.*—Salol Pill Varnish.

Salol	...	...	...	...	...	20·00
Shellac	...	...	...	...	...	30·00
Ether	...	...	...	...	...	30·00
Absolute Alcohol, sufficient to produce	...	...	...	...	...	100·00

Dissolve the salol and shellac in the ether and alcohol.

This solution is used for coating pills, which it is desired should act in the intestines only.

**SOLUTIO SANDARACÆ.**

## SANDARAC SOLUTION.

*Synonym.*—Pill Varnish.

Sandarac	...	...	...	...	50·00
Absolute Alcohol, sufficient to produce	...	...	...	...	100·00

Dissolve the sandarac in the alcohol.

This solution makes an excellent varnish for pills for which a transparent coating is desired. The pills, which should be without any adherent particles of powder, are placed in a covered pot of suitable size, with a few drops of the sandarac solution, the lid is placed on the pot, and the latter is rotated a few times in order to cover the pills with the varnish. The pills are then poured on a smooth slab or plate, separated carefully, moved gently after a brief interval with a pointed glass rod dipped in alcohol, and allowed to dry.

**SOLUTIO SAPONIS ÆTHEREA.**

## ETHEREAL SOAP SOLUTION.

*Synonym.*—Ether Soap.

Oleic Acid	...	...	...	...	35·00
Potassium Hydroxide Solution, saturated, a sufficient quantity.					
Alcohol	...	...	...	...	15·00
Oil of Lavender	...	...	...	...	0·20
Methylated Ether (specific gravity, 0·720)					
sufficient to produce	...	...	...	...	100·00

Mix the oleic acid and alcohol and neutralise with the saturated solution of potassium hydroxide in water (1 in 1), of which nearly 7·5 will be required, using phenol-phthalein as indicator. Allow the neutralised product to cool, and add the oil and ether.

Ether soap solution is used to cleanse skin areas before surgical operations. A small quantity should be well rubbed in until the surface is dry, then, with a brush and hot water, thoroughly scrub the skin. The ether, being a fat solvent, penetrates the epidermis and carries the soap with it. The detergent action of this solution may be increased by using a slight excess of potash.

NOTE. — Ethereal soap solution should be kept in well-stoppered bottles.

**SOLVELLÆ.**

## SOLUBLE TABLETS.

Soluble tablets are compressed tablets, or discs, intended to be dissolved in water for external or local use.

**Solvellæ Acidi Borici.** SOLUBLE BORIC ACID TABLETS.

Boric Acid	...	...	...	100 grammes (1500 grains)
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Compress into 100 tablets, one of which should be dissolved in 60 mls (2 fluid ounces) of warm water, for use as an eye-wash, lotion, etc.



**Solvellæ Acidi Carbolici.** SOLUBLE CARBOLIC ACID OR PHENOL TABLETS.

Carbolic Acid ... 33 grammes (500 grains)  
Compress into 100 tablets.

**Solvellæ Acidi Carbolici Fortes.** STRONG SOLUBLE CARBOLIC ACID OR PHENOL TABLETS.

Carbolic Acid ... 133 grammes (2000 grains)  
Compress into 100 tablets.

**Solvellæ Aluminis.** SOLUBLE ALUM TABLETS.

Alum ... 66 grammes (1000 grains).  
Compress into 100 tablets, one of which should be dissolved in 60 to 90 mls (2 to 3 fluid ounces) of water, for use as a gargle, mouth-wash, eye-wash, etc.

**Solvellæ Antisepticæ.** SOLUBLE ANTISEPTIC TABLETS.

*Synonym.*—Antiseptic Dental Tablets.

Benzoic Acid, in fine powder	12	decigrams	(20 grains)
Boric Acid, in fine powder	50	grammes	(750 grains)
Carbolic Acid	16	decigrams	(25 grains)
Sodium Bicarbonate	8	grammes	(125 grains)
Gum Acacia, in powder	8	grammes	(125 grains)
Carmine	12	centigrams	(2 grains)
Gluside	24	centigrams	(4 grains)
Thymol	12	decigrams	(2 grains)
Oil of Peppermint	15	decimils	(25 minims)
Oil of Gaultheria	9	mils	(15 minims)
Distilled Water, a sufficient quantity.			

Mix the solid ingredients, add the oils, granulate with the distilled water, and dry the granules by spreading them in a thin layer on paper, and exposing them for one hour at a temperature of 45°; then compress into 100 tablets, one of which should be dissolved in a wineglassful of warm water for use in cases of dental caries and suppuration, or as a mouth-wash.

**Solvellæ Betacainæ.** SOLUBLE BETACAINE TABLETS.

Betacaine Lactate ... 66 decigrams (100 grains)  
Compress into 100 tablets.

**Solvellæ Betacainæ Fortes.** STRONG SOLUBLE BETACAINE TABLETS.

Betacaine Lactate ... 33 grammes (500 grains)  
Compress into 100 tablets.

**Solvellæ Betacainæ et Sodii Chloridi.** SOLUBLE BETACAINE AND SODIUM CHLORIDE TABLETS.

Betacaine Lactate ... 5 grammes (75 grains)  
Sodium Chloride ... 20 grammes (300 grains)  
Dry the sodium chloride, mix it with the betacaine lactate, and compress into 100 tablets.

**Solvellæ Boracis Compositæ.** SOLUBLE COMPOUND BORAX TABLETS.

Borax	...	...	...	33	grammes	(500 grains)
Sodium Chloride, dried	...	...	...	16½	grammes	(250 grains)
Carbolic Acid	...	...	...	33	decigrams	(50 grains)
Sodium Bicarbonate	...	...	...	16½	grammes	(250 grains)

Mix, and compress into 100 tablets.

**Solvellæ Boracis et Cocainæ Compositæ.** SOLUBLE COMPOUND BORAX AND COCAINE TABLETS.

Borax	...	...	...	13	grammes	(200 grains)
Cocaine Hydrochloride	...	...	...	6	decigrams	(10 grains)
Sodium Chloride	...	...	...	40	grammes	(600 grains)
Boric Acid	...	...	...	6½	grammes	(100 grains)
Benzoic Acid	...	...	...	1½	grammes	(25 grains)
Menthol...	...	...	...	6	centigrams	(1 grain)
Thymol	...	...	...	6	centigrams	(1 grain)

Dry the sodium chloride, mix it with the other ingredients, and compress into 100 tablets. One dissolved in 60 to 90 mls (2 to 3 fluid ounces) of warm water to be used as a nasal or throat spray or for sniffing up the nostrils.

**Solvellæ Boro-salinæ.** SOLUBLE BORO-SALINE TABLETS.

Borax	...	...	...	33	grammes	(500 grains)
Sodium Chloride	...	...	...	33	grammes	(500 grains)

Dry the sodium chloride, mix it with the borax, and compress into 100 tablets.

**Solvellæ Boro-salinæ Fortes.** STRONG SOLUBLE BORO-SALINE TABLETS.

Borax	...	...	...	66	grammes	(1000 grains)
Sodium Chloride	...	...	...	66	grammes	(1000 grains)

Dry the sodium chloride, mix it with the borax, and compress into 100 tablets.

**Solvellæ Cocainæ.** SOLUBLE COCAINE TABLETS.

Cocaine Hydrochloride	...	...	...	66	decigrams	(100 grains)
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Compress into 100 tablets.

**Solvellæ Cocainæ Fortes.** STRONG SOLUBLE COCAINE TABLETS.

Cocaine Hydrochloride	...	...	...	33	grammes	(500 grains)
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Compress into 100 tablets.

**Solvellæ Hydrargyri et Potassii Iodidi.** SOLUBLE MERCURY AND POTASSIUM IODIDE TABLETS.

*Synonym.*—Soluble Biniodide Tablets.

Mercury and Potassium Iodide 14¼ grammes (219 grains)  
Compress into 100 tablets, one of which should be dissolved in 568¼ mls (20 fluid ounces) of water to make a solution

containing about  $\frac{1}{10}$  per cent. (1 in 4000) of mercuric potassium iodide, suitable for use as a lotion, or for rendering instruments antiseptic.

**Solvellæ Hydrargyri et Potassii Iodidi Fortes.** STRONG SOLUBLE MERCURY AND POTASSIUM IODIDE TABLETS.

*Synonym.*—Strong Soluble Biniodide Tablets.

Mercury and Potassium Iodide 57 grammes (875 grains)  
Compress into 100 tablets, one of which should be dissolved in 568 $\frac{1}{4}$  mls (20 fluid ounces) of water to make a solution containing  $\frac{1}{10}$  per cent. (1 in 1000) of mercury biniodide, suitable for the treatment of wounds.

**Solvellæ Hydrargyri Perchloridi.** SOLUBLE MERCURIC CHLORIDE TABLETS.

*Synonym.*—Antiseptic Perchloride, or Corrosive Sublimate, Tablets.

Mercuric Chloride	...	...	58 grammes (875 grains)
Sodium Chloride	...	...	58 grammes (875 grains)
Methyl Violet	...	...	12 centigrams (2 grains)

Mix as described in the case of Solvellæ Hydrargyri Perchloridi Fortes, and compress into 100 tablets, one of which should be dissolved in 560 mls (20 fluid ounces) of water, to make a solution containing  $\frac{1}{10}$  per cent. (1 in 1000) of mercuric chloride.

**Solvellæ Hydrargyri Perchloridi Fortes.** STRONG SOLUBLE MERCURIC CHLORIDE TABLETS.

*Synonym.*—Strong Antiseptic Perchloride, or Corrosive Sublimate, Tablets.

Mercuric Chloride	...	...	116 grammes (1750 grains)
Sodium Chloride	...	...	116 grammes (1750 grains)
Methyl Violet	...	...	12 centigrams (2 grains)

Dry the sodium chloride, mix it with the methyl violet and mercuric chloride, and compress into 100 tablets, one of which should be dissolved in 560 mls (20 fluid ounces) of water, to make a solution containing  $\frac{1}{5}$  per cent. (1 in 500) of mercuric chloride.

**Solvellæ Hydrargyri Perchloridi Mitis.** MILD SOLUBLE MERCURIC CHLORIDE TABLETS.

*Synonym.*—Mild Antiseptic Perchloride, or Corrosive Sublimate, Tablets.

Mercuric Chloride	...	...	14 $\frac{1}{2}$ grammes (219 grains)
Sodium Chloride	...	...	14 $\frac{1}{2}$ grammes (219 grains)
Methyl Violet	...	...	12 centigrams (2 grains)

Mix, as described in the case of Solvellæ Hydrargyri Perchloridi Fortes, and compress into 100 tablets, one of which should be dissolved in 560 mls (20 fluid ounces) of water to make a solution containing  $\frac{1}{40}$  per cent. (1 in 4000) of mercuric chloride.



**Solvellæ Hydrargyri Perchloridi Parvæ.** SMALL SOLUBLE MERCURIC CHLORIDE TABLETS.

*Synonym.*—Small Antiseptic Perchloride, or Corrosive Sublimate, Tablets.

Mercuric Chloride	...	...	33 decigrams	(50 grains)
Sodium Chloride	...	...	33 decigrams	(50 grains)
Methyl Violet	...	...	3 centigrams	( $\frac{1}{2}$ grain)

Mix, as described in the case of Solvellæ Hydrargyri Perchloridi Fortes, and compress into 100 tablets, one of which should be dissolved in a tumblerful (about 5 fluid ounces) of warm water, to make a solution containing 1 in 4500 of mercuric chloride, suitable for ophthalmic purposes.

**Solvellæ Potassii Permanganatis.** SOLUBLE POTASSIUM PERMANGANATE TABLETS.

Potassium Permanganate	...	...	33 grammes	(500 grains)
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Compress into 100 tablets, one of which should be dissolved in 280 mils (10 fluid ounces) or more of water for use in lotions.

**Solvellæ Sodii Chloridi.** SOLUBLE SODIUM CHLORIDE TABLETS.

Sodium Chloride, dried	...	...	120 grammes	(1800 grains)
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Compress into 100 tablets, one of which should be dissolved in 150 mils (5 fluid ounces) of recently boiled and cooled tap-water to produce an extemporaneous normal saline solution.

**Solvellæ Zinci Sulphatis.** SOLUBLE ZINC SULPHATE TABLETS.

Zinc Sulphate, in No. 30 crystals	...	...	26 grammes	(400 grains)
Fuch sine	...	...	15 milligrams	( $\frac{1}{4}$ grain)
Oil of Lavender	...	...	6 decimils	(10 minims)
Distilled Water	...	...	6 decimils	(10 minims)

Dissolve the fuch sine in the distilled water in a mortar, add the zinc sulphate and oil of lavender, and mix by gentle trituration; then dry the mixture by exposure to the air for two hours in a thin layer on paper, and compress into 100 tablets, one of which should be dissolved in 60 mils (2 fluid ounces) of water, for use as a lotion.

**Solvellæ Zinci Sulphatis et Aluminis.** SOLUBLE ZINC SULPHATE AND ALUM TABLETS.

Zinc Sulphate, in No. 30 crystals	...	...	65 grammes	(1000 grains)
Alum	...	...	65 grammes	(1000 grains)

Mix and compress into 100 tablets, one of which should be dissolved in 560 mils (20 fluid ounces) of warm distilled water to make a solution which may be diluted as required.

NOTE.—These tablets may be coloured with fuch sine if desired, 150 milligrams ( $2\frac{1}{2}$  grains) being used for 100 tablets.

**Solvellæ Zinci Sulphatis Fortes.** STRONG SOLUBLE ZINC SULPHATE TABLETS.

Zinc Sulphate, in No. 30 crystals	...	...	130 grammes	(2000 grains)
Fuch sine	...	...	75 milligrams	(1 $\frac{1}{4}$ grains)
Oil of Lavender	...	...	3 mils	(50 minims)
Distilled Water...	...	...	3 mils	(50 minims)

Mix, as described in the case of *Solvellæ Zinci Sulphatis*, and compress into 100 tablets, one of which should be dissolved in 300 mls (10 fluid ounces) of water, for use as a lotion.

**Solvellæ Zinci Sulphocarbolas.** SOLUBLE ZINC SULPHOCARBOLATE TABLETS.

Zinc Sulphocarbolate ... 13 grammes (200 grains)

Compress into 100 tablets, one of which should be dissolved in 60 mls (2 fluid ounces) of water for injection or external use.

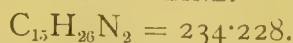
**Solvellæ Zinci Sulphocarbolas Fortes.** STRONG SOLUBLE ZINC SULPHOCARBOLATE TABLETS.

Zinc Sulphocarbolate ... 65 grammes (1000 grains)

Compress into 100 tablets, one of which should be dissolved in 300 mls (10 fluid ounces) of water, for injection or external use.

## SPARTEINA.

### SPARTEINE.



Sparteine,  $\text{C}_{15}\text{H}_{26}\text{N}_2$ , is a volatile, liquid alkaloid, obtained from broom, *Cytisus Scoparius*, Link. (N.O. Leguminosæ). It may be prepared by extracting the plant with water acidulated with sulphuric acid, concentrating the solution, and distilling with solution of sodium hydroxide until the distillate is no longer alkaline. The distillate is acidified with hydrochloric acid, brought to dryness on a water-bath, the residue moistened with water, and distilled with solid potassium hydroxide. Ammonia is first given off, and then the alkaloid, as a thick, oily liquid. The latter is freed from water by warming with sodium, and finally distilling in a current of hydrogen. Another method is to exhaust the powdered plant with 60 per cent. alcohol, distil off the alcohol, and take up the residue with tartaric acid. The acid solution is filtered, treated with potassium carbonate in excess, and shaken with ether. The ethereal solution is then extracted with solution of tartaric acid, the acid solution made alkaline with potassium carbonate, and again extracted with ether, from which, by evaporation, the pure sparteine is obtained.

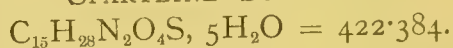
It occurs as a transparent, oily liquid, colourless when pure and freshly prepared, but absorbing oxygen, under the influence of air and light, and becoming yellowish to dark brown in colour, and thicker; heavier than water, having a penetrating odour resembling aniline, and an intensely bitter taste. It is a strong base, and combines with acids to form crystallisable salts. Sparingly soluble in water; soluble in alcohol, ether, and chloroform; insoluble in benzin, benzene, and petroleum oils. The aqueous solution is strongly alkaline. Boiling-point, about  $311^\circ$ ; rotation,  $-14.6^\circ$ . Sparteine yields a white, curdy precipitate with cadmium iodide; with sodium phosphomolybdate

a white precipitate soluble on heating. With silver nitrate there is no precipitation. Copper salts give a green precipitate, and platinum chloride a yellow, crystalline precipitate. Iodine in ethereal solution converts it into the periodide, which crystallises from alcohol in green needles.

The action of sparteine is described under *Sparteinae Sulphas*. Pure sparteine is rarely employed in medicine. The periodide has been given in pill form, but the most commonly used salt of sparteine is the sulphate (see *Sparteinae Sulphas*).

### SPARTEINÆ SULPHAS.

#### SPARTEINE SULPHATE.



Sparteine sulphate,  $\text{C}_{15}\text{H}_{28}\text{N}_2\text{H}_2\text{SO}_4, 5\text{H}_2\text{O}$ , is a salt of the dibasic alkaloid sparteine, and may be prepared by neutralising the colourless alkaloid (10 parts) with diluted sulphuric acid (about 40 parts of 10 per cent. solution), rapidly concentrating the solution, and allowing to crystallise in a warm place. Under varying conditions it crystallises with different proportions of water, and may also be obtained in the form of an anhydrous salt, but by recrystallisation from diluted alcohol the salt containing five molecules (21·32 per cent.) of water of crystallisation is obtained.

It occurs in the form of colourless, rhombohedral crystals, or as a white, crystalline powder, odourless, hygroscopic, and having a slight, saline and bitter taste. Soluble in water (2 in 1), and in alcohol (1 in 5), but insoluble in ether or chloroform. The aqueous solution has a weak, acid reaction on blue litmus paper. Heated to  $100^\circ$  it loses its water of crystallisation, the anhydrous salt melting at  $150^\circ$  to  $152^\circ$ . On ignition it leaves no residue (absence of mineral impurities). If a small quantity of the salt be warmed gently with about one-third of its weight of chromic acid, a distinct odour of coniine is evolved, and a green colouration produced. The 10 per cent. aqueous solution gives with sodium hydroxide a white precipitate, which soon unites into oily drops, and is soluble in ether or chloroform. On warming an alkaline solution no odour of ammonia should be given off. If 1 decigram be heated with  $2\frac{1}{2}$  decimils of chloroform, and 1 mil of alcoholic solution of potassium hydroxide, no odour of phenyl isocyanide should be evolved (absence of aniline). The salt should dissolve in concentrated sulphuric acid without colouration (absence of readily carbonisable organic impurities), and if a crystal of potassium bichromate be stirred with the solution a green, but not a violet, colouration should be produced (absence of strychnine). On adding 25 mils of ether to about 1 decigram of the salt, and then a few drops, but not an excess, of solution of ammonia, and afterwards an ethereal solution of iodine (1 in 50), until the solution on shaking turns from orange to dark reddish-brown in colour, the sides of the vessel containing the solution



will shortly become covered with minute, dark, greenish-brown crystals.

The general effects of sparteine resemble those of coniine, but it is very much less poisonous. It has very little action on the central nervous system, but large doses paralyse sympathetic nerve cells and the peripheral terminations of the motor nerves. It depresses the heart, so that the rhythm is slow and the contractions weak. The slow pulse and slight rise of blood pressure observed when sparteine is injected into veins have caused a digitalis-like action to be ascribed to it, and it has, therefore, been used as a substitute for digitalis; clinical observations show that these claims have no foundation, and sparteine lowers blood pressure. The diuretic action of preparations of broom-tops is due to scoparin, not to sparteine. Sparteine sulphate is the most commonly used salt of the base, and has been given in doses as large as 8 decigrams (12 grains). It is given in pills, or used in the form of hypodermic injection, from 1 to 4 decimils (2 to 6 minims) of a 15 per cent. solution, being injected as required.

*Dose.*— $1\frac{1}{2}$  to 12 centigrams (1 to 2 grains), or more.

## SPIGELIA.

### SPIGELIA.

*Synonyms.*—Indian Pink; Pink Root.

Spigelia consists of the rhizome and rootlets, or the entire plant, of the Carolina pink, *Spigelia marilandica*, Linn. (N.O. Loganiaceæ), a native of the southern United States. It is an herbaceous, perennial plant, from 30 to 50 centimetres high, with a smooth, simple stem, which is rounded below, quadrangular above, and bears a few opposite and sessile, ovate-lanceolate leaves, about 7.5 centimetres long, acuminate at the apex, and tapering towards the base. The stem sometimes terminates in a spike of brilliant, red flowers. The entire plant is collected in the autumn and dried, the rhizomes and rootlets being separated from the aerial parts of the plant, or several entire plants are made into a bundle and tied.

The rhizome is 5 centimetres or more in length, and 2 or 3 millimetres thick. It is dark brown externally, tortuous, and knotty, with numerous slender wiry rootlets attached, while it bears on the upper side short branches marked with the cup-shaped scars of the stems of former years. Internally the rhizome has a whitish wood, and a dark-coloured or decayed pith. The rootlets have a thick bark, and are about 10 centimetres long, thin, brittle, and lighter coloured than the rhizome. The drug has a somewhat aromatic odour, and a sweetish but bitter and pungent taste.

The chief constituents of Indian pink are an acrid, bitter substance, soluble in water or alcohol, but insoluble in ether, and a poisonous alkaloid named spigeline; other constituents are volatile oil, resin, tannin, wax, fat, and gum.

*Spigelia* resembles *gelseminum* in its action, depressing the action of the heart and respiration, and causing loss of muscular power when given in large doses. The drug is anthelmintic and used for the round worm; it is said to be safe and efficient if given in proper doses, followed by a saline purgative, such as magnesium sulphate. It is given in powder or as an infusion, mixed with purgatives and aromatics, such as senna, manna, and fennel. A liquid extract (1 in 1) is also used (see Notes).

NOTES.—The rhizome of *Phlox Carolina*, Linné (N.O. Polemoniaceæ), is also known as Carolina pink, but is smoother and lacks the cup-shaped scars, while the rootlets are straighter, thicker, and less wiry than those of Indian pink. Fluidextractum *Spigeliæ*, U.S.P., is prepared by exhausting *spigelia*, in No. 40 powder, by maceration and percolation, with 49 per cent. alcohol, the strength of the product being adjusted so that 1 part by volume equals 1 part of the drug. The average dose of this liquid extract is 4 mils (1 fluid drachm).

## SPIRITUS ÆTHERIS.

### SPIRIT OF ETHER.

Ether	...	...	...	...	...	35'00
Alcohol	...	...	...	...	...	70'00

Mix the ether with the alcohol.

This preparation is used as a rapid stimulant and antispasmodic. As a cardiac stimulant it acts immediately by exciting the nerve-endings in the mouth and stomach. It is rapidly absorbed and then exerts the specific effects of its ingredients.

*Dose*.— $1\frac{1}{2}$  to  $2\frac{1}{2}$  mils (20 to 40 minims), for repeated administration; for a single administration, 4 to 6 mils (60 to 90 minims).

NOTE.—*Spiritus Ætheris*, U.S.P., is prepared by mixing  $32\frac{1}{2}$  of ether (96 per cent.) with  $67\frac{1}{2}$  of alcohol (95 per cent.).

## SPIRITUS ÆTHERIS COMPOSITUS.

### COMPOUND SPIRIT OF ETHER.

*Synonym*.—Hoffmann's Anodyne.

Ether	...	...	...	...	...	13'75
Alcohol	..	...	...	...	...	195'00
Sulphuric Acid	...	...	...	...	...	90'00
Distilled Water	...	...	...	...	...	3'75

Sodium Bicarbonate, a sufficient quantity.

Gradually add the sulphuric acid to 100 of the alcohol; set aside for twenty-four hours; then distil until a thermometer, dipping in the liquid, rises to  $171.5^{\circ}$ . Pour the distillate into a separator, and after separation remove and reject the lower layer. Wash the upper ethereal layer by shaking with the water, and agitate the mixture with sodium bicarbonate, added in portions, until the liquid is nearly neutral to litmus. Separate the washed, ethereal layer, add to it the ether and 95 of alcohol, previously mixed, and finally filter. The product is a clear, colourless liquid having a characteristic ethereal

taste and odour. Specific gravity, 0·808 to 0·812. It should give an opalescent solution when mixed with twice its volume of water, and on evaporating 2 or 3 mils spontaneously on a watch-glass the residue should not have an unpleasant odour (absence of empyreumatic impurities).

The properties of this preparation closely resemble those of spirit of ether.

*Dose.*— $1\frac{1}{2}$  to  $2\frac{1}{2}$  mils (20 to 40 minims), for repeated administration; for a single administration, 4 to 6 mils (60 to 90 minims).

*NOTES.*—Oleum *Æthereum*, U.S.P., is prepared in a similar way to the ethereal oil formed during the operation described above, with 100 of sulphuric acid (92·5 per cent.), 100 of alcohol (95 per cent.), 2·5 of distilled water, and a volume of ether (96 per cent.) equal to that of the yellow, ethereal, oily liquid produced. The specific gravity of the finished product is 0·925 at 25°. Spiritus *Ætheris Compositus*, U.S.P., is prepared by mixing 32·5 of ether (96 per cent.) with 65 of alcohol (95 per cent.) and 2·5 of ethereal oil. Average dose, 4 mils (1 fluid drachm).

## SPIRITUS ÆTHERIS NITROSI.

SPIRIT OF NITROUS ETHER.

*Synonym.*—Sweet Spirit of Nitre.

Nitric Acid	...	...	...	...	...	6·00
Sulphuric Acid	...	...	...	...	...	4·00
Copper	...	...	...	...	...	4·00
Alcohol, a sufficient quantity.						

Mix the sulphuric acid gradually with 40 of the alcohol, in a retort or flask containing the copper, and add gradually 5 of the nitric acid, stirring meanwhile. Fit the retort or flask with a thermometer, and attach it to a condenser and receiver, both kept cool with ice-cold water, the receiver containing 40 of the alcohol; heat the retort gently and allow the liquid to distil at a temperature rising from 76·5° to 79·5°, but not exceeding 82°, until the volume of liquid in the receiver has been increased to 64. Having withdrawn the source of heat, allow the retort to cool, add the remaining nitric acid and again distil until the total distillate measures 68. Add 40 of the alcohol to the liquid in the receiver, or as much as will make the finished product contain about  $2\frac{1}{2}$  per cent. of ethyl nitrite.

It occurs as a limpid, faintly yellow, inflammable liquid, with a fruity odour and characteristic taste. Specific gravity, 0·838 to 0·842. When poured carefully on to a strong solution of ferrous sulphate acidified with sulphuric acid, a brown colouration is produced at the surface of contact of the two liquids. If 10 mils of the spirit be mixed with 5 mils of normal solution of sodium hydroxide and 5 mils of water, the mixture should become yellow, but should not appear brown after standing for twelve hours (limit of aldehyde). The spirit should not contain more than traces of free acid, as indicated by effervescence when it is shaken with sodium



bicarbonate. The freshly prepared spirit should contain about  $2\frac{1}{2}$  per cent. by weight of ethyl nitrite, while spirit which has been kept for some time should contain from  $1\frac{3}{4}$  to 2 per cent. by weight of ethyl nitrite.

Spirit of nitrous ether is used as a diaphoretic in incipient colds and as a mild diuretic. It has, though to a smaller extent, the vaso-dilator action of other nitrites (see Amyl Nitris); this effect is produced more slowly and is more lasting. It is therefore sometimes used to lower high blood pressure. The spirit is given often with other diaphoretics, such as Liquor Ammonii Acetatis, in mixture form. It is incompatible with potassium iodide, sodium salicylate, antipyrin and ferrous sulphate. Reaction between potassium iodide or antipyrin and spirit of nitrous ether may be avoided by neutralising the latter, or, better, by prescribing them in alkaline combination. Neutralisation does not, however, prevent reaction between sodium salicylate and spirit of nitrous ether, and mixtures of these substances become orange-red in colour.

*Dose.*— $1\frac{1}{2}$  to  $2\frac{1}{2}$  mils (20 to 40 minims) for repeated administration; for a single administration, 4 to 6 mils (60 to 90 minims).

*NOTES.*—This preparation contains ethyl nitrite, aldehyde, and other substances dissolved in alcohol. It should be stored in a cool, dark place, and in small, well-stoppered, amber-coloured bottles. A preparation known as Solutio Ætheris Nitrosi (1 to 7) is sold for preparing a spirit resembling Spiritus Ætheris Nitrosi, but the product is not identical with the official preparation.

## SPIRITUS AMMONIÆ AROMATICUS.

### AROMATIC SPIRIT OF AMMONIA.

*Synonyms.*—Spiritus Ammoniaë Compositus; Spirit of Sal Volatile.

Ammonium Carbonate...	..	..	..	2'00
Strong Solution of Ammonia ...	..	..	..	4'00
Oil of Nutmeg ...	..	..	..	0'28
Oil of Lemon ...	..	..	..	0'40
Alcohol ...	..	..	..	60'00
Distilled Water...	..	..	..	30'00

Dissolve the oils in the previously mixed alcohol and water, place the solution in a retort, and distil until the liquid collected measures 70; then collect separately an additional 4·5 of distillate, pour this into a bottle capable of holding rather more than 10, add the ammonium carbonate and strong solution of ammonia, cork securely, and heat the bottle gently on a water-bath to 60°, and agitate occasionally until solution is effected. When this solution is cold, filter it through cotton wool, and add it gradually to the first portion of the distillate.

The product is a transparent, nearly colourless liquid, with a pungent, ammoniacal taste and odour. It tends to darken slightly on keeping. Specific gravity, 0·888 to 0·893. The spirit should contain the equivalent of about 2·4 per cent. of ammonia gas (as free ammonia and carbonate), or 2·16 grammes in 100 mils. It is stated

officially that 20 mils of the spirit, after the addition of 16 mils of solution of barium chloride (1 in 10), should yield a precipitate which becomes more copious on heating to  $71^{\circ}$ , and that, after filtering, the filtrate should yield a further precipitate, when more of the reagent is added and the liquid again heated. This test is unsatisfactory, because, theoretically, more barium chloride is added than is sufficient to precipitate all the carbonate, but the precipitation of the carbonate is only complete if a considerable excess of barium chloride be present. The addition of ammonium chloride is said to render the precipitation more definite. Its action is that of the ammonia it contains. It is carminative and stimulates the heart and respiration reflexly. The spirit is employed as a restorative in fainting, in chronic bronchitis, and some gastric diseases.

Aromatic spirit of ammonia is employed as a stimulant and anti-spasmodic, and is especially useful with potassium or ammonium bromide in nervous headache and hysterical conditions. It is incompatible with acids and acid salts, salts of iron and the alkaline earths, and solutions of alkaloids.

*Dose.*— $1\frac{1}{2}$  to  $2\frac{1}{2}$  mils (20 to 40 minims), for repeated administration; for a single administration, 4 to 6 mils (60 to 90 minims).

*NOTES.*—*Spiritus Ammoniae*, U.S.P., is an alcoholic solution of ammonia, containing 10 per cent. by weight of the gas. It is used as a stimulant and anti-spasmodic, the average dose being 1 mil (15 minims), but the aromatic spirit is usually preferred. *Spiritus Ammoniae Aromaticus*, U.S.P., is flavoured with the oils of nutmeg, lemon, and lavender flowers, and its specific gravity is about 0.900 at  $25^{\circ}$ .

## SPIRITUS AMMONIÆ FETIDUS.

### FETID SPIRIT OF AMMONIA.

Asafetida, in small pieces	...	...	...	7.50
Strong Solution of Ammonia	...	...	...	10.00
Alcohol, sufficient to produce	...	...	...	100.00

Macerate the asafetida in 75 of the alcohol for twenty-four hours, distil off the whole of the alcoholic liquid, add the distillate to the strong solution of ammonia, mix, and add sufficient alcohol to produce the required volume.

This preparation has the same action as aromatic spirit of ammonia, but is used mainly in hysteria.

*Dose.*— $1\frac{1}{2}$  to  $2\frac{1}{2}$  mils (20 to 40 minims), for repeated administration; for a single administration, 4 to 6 mils (60 to 90 minims).

## SPIRITUS AMYGDALÆ AMARÆ.

### SPIRIT OF BITTER ALMOND.

*Synonym.*—Essence of Bitter Almonds.

Oil of Bitter Almond	...	...	...	1.00
Alcohol	...	...	...	85.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the oil in the alcohol, and add sufficient distilled water to make up the required volume.

Spirit of bitter almond is used chiefly as a flavouring agent.

*Dose.*—3 to 10 decimils (5 to 15 minims).

NOTE.—Spiritus Amygdalæ Amaræ, U.S.P., contains a minute proportion of hydrocyanic acid.

### SPIRITUS ANISI.

#### SPIRIT OF ANISE.

Oil of Anise	...	...	...	...	10·00
Alcohol, sufficient to produce	...	...	...	...	100·00

Dissolve the oil of anise in the alcohol.

Spirit of anise is used chiefly as a flavouring agent.

*Dose.*—3 to 12 decimils (5 to 20 minims).

### SPIRITUS ARMORACIÆ COMPOSITUS.

#### COMPOUND SPIRIT OF HORSERADISH.

Horseradish Root, scraped	...	...	...	...	12·50
Dried Bitter-orange Peel, well bruised	...	...	...	...	12·50
Nutmeg, bruised	...	...	...	...	0·32
Alcohol	...	...	...	...	62·50
Distilled Water	...	...	...	...	75·00

Macerate the horseradish root with the water for an hour, then add the bruised orange peel, nutmeg, and alcohol, mix, and distil, collecting 100 of distillate.

This preparation is used in atonic dyspepsia and to improve the appetite.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

### SPIRITUS AURANTII COMPOSITUS.

#### COMPOUND SPIRIT OF ORANGE.

Oil of Orange	...	...	...	...	10·00
Oil of Lemon	...	...	...	...	2·50
Oil of Coriander	...	...	...	...	1·00
Oil of Anise	...	...	...	...	0·25
Alcohol, sufficient to produce	...	...	...	...	100·00

Mix the oils and dissolve in the alcohol.

This preparation is used chiefly as a flavouring agent. It should be kept in completely filled, well-stoppered bottles, in a cool and dark place.

*Dose.*—3 to 12 decimils (5 to 20 minims).

NOTE.—Spiritus Aurantii Compositus, U.S.P., is twice the strength of this preparation, being prepared by mixing 20 of oil of orange peel, 5 of oil of lemon, 2 of oil of coriander, and 0·5 of oil of anise, with sufficient 95 per cent. alcohol to produce 100 by volume.



**SPIRITUS CAJUPUTI.**

## SPIRIT OF CAJUPUT.

Oil of Cajuput	...	...	...	...	10'00
----------------	-----	-----	-----	-----	-------

Alcohol, sufficient to produce	...	...	...	...	100'00
--------------------------------	-----	-----	-----	-----	--------

Dissolve the oil of cajuput in the alcohol.

Spirit of cajuput is used as a stimulant and antispasmodic in flatulent colic, etc.

*Dose.*—3 to 12 decimils (5 to 20 minims).

**SPIRITUS CAMPHORÆ.**

## SPIRIT OF CAMPHOR.

Camphor	...	...	...	...	10'00
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Alcohol, sufficient to produce	...	...	...	...	100'00
--------------------------------	-----	-----	-----	-----	--------

Dissolve the camphor in the alcohol.

Spirit of camphor is given on sugar as a diaphoretic and expectorant for colds.

*Dose.*—3 to 12 decimils (5 to 20 minims).

**SPIRITUS CAMPHORÆ COMPOSITUS.**

## COMPOUND SPIRIT OF CAMPHOR.

Camphor...	...	...	...	...	0'25
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Benzoic Acid	...	...	...	...	0'50
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Oil of Anise	...	...	...	...	0'25
--------------	-----	-----	-----	-----	------

Liquid Extract of Liquorice	...	...	...	...	1'00
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Alcohol (60 per cent.), sufficient to produce	...	...	...	...	100'00
---	-----	-----	-----	-----	--------

Dissolve the benzoic acid, camphor, and oil of anise in 90 of the alcohol, add the liquid extract of liquorice, and sufficient of the alcohol to make up the required volume. Filter if necessary.

This preparation is added to children's cough mixtures as a mild expectorant.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—A preparation similar to this in composition is commonly sold as "Paregoric without Opium," but the use of that name should be discouraged.

**SPIRITUS CHLOROFORMI.**

## SPIRIT OF CHLOROFORM.

*Synonyms.*—Spirit of Chloric Ether; Chloric Ether.

Chloroform	...	...	...	...	5'00
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Alcohol, sufficient to produce	...	...	...	...	100'00
--------------------------------	-----	-----	-----	-----	--------

Dissolve the chloroform in the alcohol.

Spirit of chloroform is used as a flavouring agent and as an antispasmodic and carminative. It is usually prescribed with other substances.

*Dose.*—3 to 12 decimils (5 to 20 minims) for repeated administration; for a single administration, 2 to 2 $\frac{1}{2}$  mils (30 to 40 minims).

NOTE.—Spiritus Chloroformi, U.S.P., is prepared by mixing 6 of chloroform with 94 of 95 per cent. alcohol.

**SPIRITUS CINNAMOMI.**

## SPIRIT OF CINNAMON.

Oil of Cinnamon	...	...	...	10'00
Alcohol, sufficient to produce	...	...	...	100'00

Dissolve the oil of cinnamon in the alcohol.

Spirit of cinnamon is added to mixtures as a flavouring agent and is taken on sugar as an antiseptic in nasal catarrh and influenzal colds.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTE.*—Spiritus Cinnamomi, U.S.P., is prepared by mixing 10 of oil of cassia with 90 of 95 per cent. alcohol.

**SPIRITUS COLONIENSIS.**

## COLOGNE SPIRIT.

*Synonym.*—Eau de Cologne.

Oil of Bergamot	...	...	...	1'25
Oil of Lemon	...	...	...	0'50
Oil of Orange-flower	...	...	...	0'20
Oil of Rosemary	...	...	...	0'15
Oil of Thyme	...	...	...	0'05
Orange-flower Water, undiluted	...	...	...	4'50
Alcohol, sufficient to produce	...	...	...	100'00

Dissolve the oils in the alcohol, and add the orange-flower water gradually.

Cologne spirit is used chiefly for toilet purposes.

**SPIRITUS CREOSOTI.**

## SPIRIT OF CREOSOTE.

Creosote	...	...	...	...	2'50
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the creosote in the alcohol.

Spirit of creosote is given in chronic bronchitis and phthisis, as an antiseptic during excretion from the lungs, and to lessen cough and expectoration.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**SPIRITUS FRUMENTI.**

## WHISKY.

*Synonym.*—Whiskey.

Whisky is an alcoholic liquid obtained by distillation from fermented malt and occasionally, as in Ireland, from other grain, and containing about 44 to 45 per cent. of ethyl hydroxide. It should be distilled in a pot still.

It occurs as an amber-coloured liquid, with a distinctive odour and taste, and a slightly acid reaction. Specific gravity, 0'924 to 0'947.

It should be free from more than traces of fusel oil and tannin, and entirely free from added sugar, glycerin, and aromatic substances.

Whisky is a favourite means of administering alcohol (see Alcohol), and is frequently preferred to brandy, because it is more readily obtained unadulterated.

*Dose*.—30 to 120 mils (1 to 4 fluid ounces).

### SPIRITUS GAULTHERIÆ.

SPIRIT OF GAULTHERIA.

*Synonym*.—Essence of Wintergreen.

Oil of Gaultheria	...	...	...	...	5.00
Alcohol, sufficient to produce	...	...	...	...	100.00

Dissolve the oil of gaultheria in the alcohol.

Spirit of gaultheria is used principally as a flavouring agent.

*Dose*.—1 to 3 mils (15 to 45 minims.)

### SPIRITUS JUNIPERI.

SPIRIT OF JUNIPER.

Oil of Juniper	...	...	...	...	5.00
Alcohol, sufficient to produce	...	...	...	...	100.00

Dissolve the oil of juniper in the alcohol, and filter, if necessary, through powdered talc.

Spirit of juniper is used as an antispasmodic in flatulence and colic, and as a diuretic; it gives the urine an odour of violets.

*Dose*.—1½ to 4 mils (20 to 60 minims.)

### SPIRITUS JUNIPERI COMPOSITUS.

COMPOUND SPIRIT OF JUNIPER.

Oil of Juniper	...	...	...	...	0.40
Oil of Caraway	...	...	...	...	0.05
Oil of Fennel	...	...	...	...	0.05
Alcohol	...	...	...	...	75.00
Distilled Water, sufficient to produce	...	...	...	...	100.00

Dissolve the oils in the alcohol and gradually add the distilled water.

*Dose*.—4 to 12 mils (1 to 3 fluid drachms).

NOTE.—This preparation corresponds to Spiritus Juniperi Compositus, U.S.P.

### SPIRITUS LAVANDULÆ.

SPIRIT OF LAVENDER.

Oil of Lavender	...	...	...	...	10.00
Alcohol, sufficient to produce	...	...	...	...	100.00

Dissolve the oil of lavender in the alcohol.



Spirit of lavender is used as a flavouring agent and perfume; also to dab on the skin to prevent insect bites.

*Dose*.—3 to 12 decimils (5 to 20 minims).

NOTE.—*Spiritus Lavanulæ*, U.S.P., is prepared by mixing 5 of oil of lavender flowers with 95 of 95 per cent. alcohol.

## SPIRITUS MENTHÆ PIPERITÆ.

### SPIRIT OF PEPPERMINT.

Oil of Peppermint	...	...	...	...	10'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the oil of peppermint in the alcohol.

Spirit of peppermint is used as a flavouring agent and carminative. It is exactly half the strength of *Essentia Menthæ Piperitæ*.

*Dose*.—3 to 12 decimils (5 to 20 minims).

NOTE.—*Spiritus Menthæ Piperitæ*, U.S.P., is prepared by dissolving 10 of oil of peppermint in 90 of 95 per cent. alcohol, macerating 1 of bruised peppermint in the solution for twenty-four hours, then filtering, and making up the volume to 100 with alcohol.

## SPIRITUS MENTHÆ VIRIDIS.

### SPIRIT OF SPEARMINT.

Oil of Spearmint	...	...	...	...	10'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the oil of spearmint in the alcohol.

Spirit of spearmint is used as a flavouring agent and carminative, in the same way as spirit of peppermint.

*Dose*.—3 to 12 decimils (5 to 20 minims).

NOTE.—*Spiritus Menthæ Viridis*, U.S.P., is prepared by dissolving 10 of oil of spearmint in 90 of 95 per cent. alcohol, macerating 1 of bruised spearmint in the solution for twenty-four hours, then filtering and making up the volume to 100 with alcohol.

## SPIRITUS MYRISTICÆ.

### SPIRIT OF NUTMEG.

Oil of Nutmeg	...	...	...	...	10'00
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the oil of nutmeg in the alcohol, and filter, if necessary, through powdered talc.

Spirit of nutmeg is used chiefly as a flavouring agent and carminative. Large doses cause delirium and coma.

*Dose*.—3 to 12 decimils (5 to 20 minims).

**SPIRITUS PIMENTÆ.**

SPIRIT OF PIMENTO.

*Synonyms.*—Spiritus Myrciæ; Bay Rum.

Oil of Pimento Leaves	...	...	...	0·75
Oil of Orange Peel	...	...	...	0·05
Oil of Pimento...	...	...	...	0·05
Alcohol	...	...	...	64·00
Distilled Water, sufficient to produce	...	...	...	100·00

Dissolve the oils in the alcohol, gradually add the water, set aside for eight days, then filter.

Spirit of pimento is used as a wash for the hair, and as an astringent application to the face after shaving.

**SPIRITUS RECTIFICATUS.**

RECTIFIED SPIRIT.

Rectified spirit is 90 per cent. alcohol (see Alcohol). It contains 85·65 per cent. by weight of ethyl hydroxide, and is of specific gravity 0·834, whereas the rectified spirit of the British Pharmacopœia, 1885, contained 84 per cent. of ethyl hydroxide, and was of specific gravity 0·838.

**SPIRITUS RESORCINI.**

SPIRIT OF RESORCIN.

*Synonyms.*—Spiritus Capillaris; Spiritus Capillorum; Lotio Resorcini.

Resorcin	...	...	...	...	2·50
Castor Oil	...	...	...	...	2·50
Cologne Spirit	...	...	...	...	20·00
Alcohol, sufficient to produce	...	...	...	...	100·00

Dissolve the resorcin and castor oil in the Cologne spirit and alcohol.

This preparation is used for dandruff and alopecia. The hair should be free from all traces of soap or alkali before the spirit is applied, or it may be discoloured.

**SPIRITUS ROSMARINI.**

SPIRIT OF ROSEMARY.

Oil of Rosemary	...	...	...	10·00
Alcohol, sufficient to produce	...	...	...	100·00

Dissolve the oil of rosemary in the alcohol.

Spirit of rosemary is used chiefly as a perfume for hair lotions.

NOTE.—This preparation is five times the strength of Spiritus Rosmarini, B.P., 1885.

**SPIRITUS SAPONATUS.**

SOAP SPIRIT.

Soft Soap	...	...	...	65·00
Alcohol, sufficient to produce	...	...	...	100·00

Dissolve the soap in the alcohol.

This preparation is a detergent solution for use as a shampoo. It may be perfumed with lavender or other oil, and such antiseptics as thymol, naphthol or mercury biniodide may be added if necessary.

NOTE.—*Spiritus Saponatus* of the German Pharmacopœia is prepared by saponifying 6 by weight of olive oil with 7 by weight of solution of potash (specific gravity, 1·138 to 1·140), and adding 30 by weight of alcohol and 17 of water.

## SPIRITUS SAPONIS KALINI.

### SPIRIT OF POTASH SOAP.

Potash Soap	...	...	...	...	65·00
Spirit of Lavender	...	...	...	...	3·00
Alcohol, sufficient to produce	...	...	...	...	100·00

Dissolve the soap in the alcohol, and add the spirit of lavender.

This preparation is used to cleanse the skin before operations (see also *Solutio Saponis Etherea*).

NOTES.—This preparation resembles *Linimentum Saponis Mollis*, U.S.P. The linseed oil soap used is a more efficient detergent than the ordinary soft soap. *Spiritus Saponis Kalini* (Hebra) is prepared with equal weights of potash soap, spirit of lavender, and alcohol; *Unna's spirit* is prepared with 100 of potash soap, 7½ by weight of oil of lavender, and 100 by weight of 95 per cent. alcohol.

## SPIRITUS VINI GALLICI.

### BRANDY.

Brandy is obtained by distillation from the wine of grapes and matured by age.

It occurs as a pale, amber-coloured liquid, having a characteristic odour and taste, and, as a rule, a slightly acid reaction. Specific gravity, about 0·957. When exposed on clean, white filter-paper it should leave no unpleasant odour after evaporation (absence of fusel oil and allied impurities). If shaken with half its weight of kaolin, set aside for half an hour and filtered, the colour should scarcely be lighter than that of the brandy before treatment (absence of caramel colouring). It should be free from added sugar, glycerin, and aromatic substances, and should contain not more than traces of tannin.

The chief constituent of brandy is ethyl hydroxide, of which it should contain not less than 36½ per cent. by weight, or 43½ per cent. by volume. The characteristic odour and flavour of brandy are due chiefly to the presence of ænanthic ether and other volatile products derived from the wine. Some of the vascular effects are due to these substances.

Brandy is employed in medicine chiefly as *Mistura Spiritus Vini Gallici*. For its action see under Alcohol.

NOTE.—*Spiritus Vini Gallici*, U.S.P., contains from 39 to 47 per cent. by weight of absolute alcohol, and its specific gravity is from 0·925 to 0·941.



**STANNI CHLORIDUM.**

STANNOUS CHLORIDE.

*Synonym.*—Tin Chloride.

Stannous chloride,  $\text{SnCl}_2, 2\text{H}_2\text{O}$ , may be obtained by heating pure tin, in foil or granules, with strong hydrochloric acid, keeping the metal in excess, and evaporating the resulting solution to the crystallising point.

It occurs in colourless crystals. Soluble in acidified water or alcohol. If the aqueous solution be diluted with much water a hydrated oxychloride,  $\text{SnCl}_2\text{SnO}, 2\text{H}_2\text{O}$ , separates.

Stannous chloride is used for testing purposes, the official test solution (solution of stannous chloride) being prepared by heating 20 of granulated tin with 60 of hydrochloric acid, mixed with 20 of distilled water, until gas ceases to evolve, then adding sufficient distilled water to produce 100 by volume, the undissolved tin being allowed to remain in the solution.

NOTES.—Solutio Stanni Chloridi, P.G., is prepared by mixing 5 of crystalline stannous chloride with 1 by weight of hydrochloric acid (25 per cent.), then saturating the solution with dry hydrochloric acid gas, and filtering it through asbestos, after allowing it to stand awhile; the specific gravity of this solution of stannous chloride is 1.900.

**STAPHISAGRIÆ SEMINA.**

STAVESACRE SEEDS.

*Synonym.*—Staphisagria.

Stavesacre seeds are obtained from *Delphinium Staphisagria*, Linn. (N.O. Ranunculaceæ), a herb indigenous to Asia Minor and Southern Europe and cultivated in France and Italy.

The dried, ripe seeds are brown, when fresh, changing to a dull, earthy colour on keeping, obscurely quadrangular or triangular in shape, with a reticulated and pitted surface. The minute embryo is embedded in a large, whitish, oily endosperm, which is intensely bitter and acrid, the seed-coats being tasteless. The drug has no odour.

The seeds contain several alkaloids, amounting altogether to about 1 per cent. Of these the most important are delphinine, delphisine, and delphinoidine; staphisagrine occurs in minute proportion only, while the alkaloid formerly known as staphisagrine appears to be a mixture. Delphinine,  $\text{C}_{31}\text{H}_{49}\text{NO}_7$ , forms rhombic crystals which decompose at  $120^\circ$  before the melting-point is reached; it is easily soluble in benzene, chloroform, ether, and absolute alcohol; it is intensely toxic, acting chiefly upon the respiration and circulation. Delphisine is isomeric with delphinine; it is also crystalline and closely resembles delphinine, but is about twice as toxic. Delphinoidine is amorphous and much less toxic than delphinine. Stavesacre seeds also contain about 20 to 25 per cent. of fixed oil; when this is expressed from the seeds the greater part of the alkaloids and

practically all the delphinine are also removed. The drug yields from 10 to 13 per cent. of ash.

Stavesacre seeds are used chiefly as Unguentum Staphisagriæ to destroy pediculi. This action is resident in the expressed oil, from which an ointment may also be prepared by mixing with 7 parts of benzoated lard. Lotio Staphisagriæ is a non-greasy preparation for the same purpose. Delphinine resembles aconitine in its physiological action. It has been given internally in doses of 1 milligram ( $\frac{1}{60}$  grain) in neuralgia and asthma. Applied to the skin it produces tingling and numbness, and an ointment (2 per cent.) has been used for neuralgia.

*Dose of Stavesacre Seeds.*—3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

## STRAMONII FOLIA.

STRAMONIUM LEAVES.

*Synonym.*—Stramonium.

Stramonium leaves are obtained from *Datura Stramonium*, Linn. (N.O. Solanaceæ), a bushy annual cultivated in England, Germany, Hungary, etc.

The commercial drug consists of the leaves and young shoots collected while the plant is in flower and subsequently dried, but the official description permits of the use of the leaves only. These shrivel considerably as they dry; when expanded they are seen to be sinuate-dentate in outline (10 to 15 centimetres long), usually unequal at the base, and glabrous or nearly so, although when quite young they bear scattered hairs. Portions of the lamina, when cleared by solution of chloral hydrate and examined under the microscope, exhibit wavy epidermal cells, stomata surrounded by three or four cells, of which one is smaller than the others, and numerous cluster-crystals of calcium oxalate. They have a characteristic, disagreeable odour, and saline, bitterish taste. In addition to the leaves the commercial drug usually contains the shrivelled, bristly, young fruits, tubular calyx and yellowish corolla.

The drug contains from 0.1 to 0.3 per cent. of alkaloid, the average being about 0.22 per cent. This consists chiefly of hyoscyamine associated with atropine and scopolamine. The yield of ash varies from about 13 to 20 per cent.

The properties of stramonium are virtually those of the alkaloid hyoscyamine. The drug is used chiefly to relieve the spasmodic contractions of the bronchioles in asthma; it paralyses the peripheral ends of the vagi in the bronchioles, so that the latter relax, and allow an increased amount of air to enter and leave the lungs. It is given internally as Tinctura Stramonii in mixture form, often with tincture of lobelia and potassium bromide. The leaves are smoked in cigarettes or mixed with potassium nitrate and other anti-

asthmatic substances, then burned and the fumes inhaled (see *Pulvis Stramonii Compositus*).

*Dose*.—3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

NOTE.—Stramonium leaves are sometimes imported in a broken (laminated, condition, and are then not unfrequently adulterated; in such cases microscopical examination is necessary.

## STRAMONII SEMINA.

### STRAMONIUM SEEDS.

Stramonium seeds are obtained from *Datura Stramonium*, Linn. (N.O. Solanaceæ).

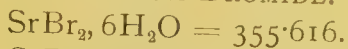
The dried, ripe seeds are dark brown or nearly black in colour, flattened, reniform in outline, and averaging about 4 millimetres in length. The surface is reticulated and minutely pitted. The embryo is curved in longitudinal section and is embedded in an oily endosperm. The seeds have a scarcely perceptible odour, but a bitter, oily taste.

The seeds contain from 0.16 to 0.28 per cent. of alkaloid, the average being 0.22 per cent., consisting of hyoscyamine associated with atropine and scopolamine; they also contain from 15 to 30 per cent. of fixed oil; the latter has a specific gravity of 0.919, and contains daturic and other acids. The drug yields about 2 per cent. of ash.

The properties of stramonium seeds resemble those of stramonium leaves. They are used in the preparation of *Extractum Stramonii*, which is given in pills to allay cough in spasmodic and bronchitic asthma. In case of poisoning by stramonium the antidotes recommended for belladonna poisoning should be applied.

## STRONTII BROMIDUM.

### STRONTIUM BROMIDE.



Strontium bromide,  $\text{SrBr}_2, 6\text{H}_2\text{O}$ , may be prepared by neutralising diluted hydrobromic acid with strontium carbonate (free from barium and calcium), using excess, filtering the mixture, and evaporating the filtrate until crystals begin to form. On cooling, the separated salt is collected, and carefully dried at a moderate heat. Strontium hydroxide has been recommended in place of the carbonate as being more easily obtained pure. Another method is to decompose ferrous bromide with strontium hydroxide. The salt contains 30.39 per cent. of water of crystallisation, and 44.97 per cent. of bromine.

It occurs in colourless, transparent, odourless crystals, which are very deliquescent, and have a bitter, saline, unpleasant, metallic taste. Soluble in water (2 in 1) and alcohol (1 in 3), but insoluble in ether. It is precipitated from the alcoholic solution on the addition of an equal volume of ether. The aqueous solution is



neutral to litmus paper. On heating, the salt first melts in its water of crystallisation, and then becomes anhydrous at  $120^{\circ}$  to  $130^{\circ}$ . The anhydrous salt melts at  $630^{\circ}$ , without decomposition. On adding 1 mil of chloroform to 10 mils of a 5 per cent. aqueous solution, and then chlorine water diluted with an equal volume of water, drop by drop, the liberated bromine will dissolve in the chloroform with a yellow to orange colour without any tint of violet (absence of iodide). It should be free from heavy metals, and the limit of barium may be ascertained by dissolving 1 gramme of the salt and an equal quantity of sodium acetate in 5 mils of water, making the solution slightly acid with diluted acetic acid; on adding  $2\frac{1}{2}$  decimils of a 10 per cent. solution of potassium bichromate and shaking there should be no cloudiness within three minutes.

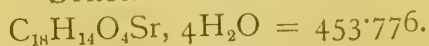
The strontium ion is comparatively inert even when injected directly into the circulation; its action resembles that of calcium, but it is even less poisonous. Strontium salts are absorbed very slowly from the intestine, and are excreted chiefly by the bowel. Strontium bromide is used in place of potassium bromide; it is stated, erroneously, to be less depressing than the latter salt, and is employed especially in gastric affections, nervous dyspepsia, etc. Owing to its slower rate of absorption, it is not so useful in epilepsy as potassium bromide. It is given in solution in mixture form. Strontium salts are incompatible with alkali carbonates and bicarbonates.

*Dose.*— $\frac{1}{4}$  to 2 grammes (5 to 30 grains).

NOTES.—Strontii Bromidum Exsiccatum, the anhydrous salt ( $\text{SrBr}_2 = 247.52$ ), is also found in commerce, and may be prepared by drying the hydrated salt at  $120^{\circ}$  to  $130^{\circ}$ . It occurs as a white, hygroscopic powder, and contains 64.60 per cent. of bromine. One hundred parts of the hydrated salt are equivalent to 69.60 parts of the anhydrous salt. The dose of the anhydrous salt is from 3 to 10 decigrams (5 to 15 grains).

## STRONTII CINNAMAS.

### STRONTIUM CINNAMATE.



Strontium cinnamate,  $(\text{C}_6\text{H}_5\text{CHCHCO}_2)_2\text{Sr}, 4\text{H}_2\text{O}$ , may be prepared by double decomposition between an alkali cinnamate and a strontium salt. The precipitate formed is dissolved in boiling water, from which it separates on cooling. The salt contains the equivalent of 65.28 per cent. of cinnamic acid, and 15.88 per cent. of water of crystallisation.

It occurs in the form of white, prismatic crystals, or as a white, or whitish, amorphous powder. Soluble in cold water (1 in 100), much more so in hot water; insoluble in alcohol. At ordinary temperatures, in dry air, it loses one molecule of water, and the remaining three molecules when heated to  $140^{\circ}$ . On being heated it gives off the odour of bitter almonds. Strong nitric acid turns it yellow, and gives off the odour of oil of cinnamon and oil of bitter almonds. The aqueous

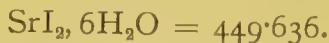
solution gives with ferric salts a yellow precipitate ; with manganese chloride, the cinnamate being in excess, a white precipitate of the manganese salt, soon becoming yellowish and crystalline, is produced.

Strontium cinnamate has been recommended for use in malignant disease similarly to sodium cinnamate, the salt being suspended in a mixture of 3 of glycerin and 5 of water, and given by hypodermic injection. Its employment is based on misconception as to its action (see *Sodii Cinnamas*).

*Dose.*—1 to 3 decigrams (2 to 5 grains).

### STRONTII IODIDUM.

STRONTIUM IODIDE.



Strontium iodide,  $\text{SrI}_2, 6\text{H}_2\text{O}$ , may be prepared by neutralising hydriodic acid with strontium carbonate, filtering the solution, concentrating and crystallising.

It occurs in colourless, transparent, odourless plates or crystalline masses, which are deliquescent, and have a bitter, saline taste. Soluble in water (2 in 1) and in alcohol, and slightly soluble in ether. The crystals melt and gradually lose their water of crystallisation when cautiously heated ; at a red heat the salt is decomposed, losing iodine, and leaving a residue of strontium oxide. The salt should respond to the usual tests for strontium. It should be free from heavy metals, and not contain more than traces of barium (see under *Strontii Bromidum*).

Strontium iodide possesses similar properties to the alkali iodides, and has been used in their place for chronic endocarditis.

*Dose.*— $\frac{1}{4}$  to 1 gramme (5 to 15 grains).

### STRONTII SALICYLAS.

STRONTIUM SALICYLATE.



Strontium salicylate,  $\text{Sr}(\text{C}_7\text{H}_5\text{O}_3)_2, 2\text{H}_2\text{O}$ , may be prepared by adding 10 of salicylic acid to 100 of hot water, then adding 5·34 of strontium carbonate, free from iron, warming until effervescence ceases, filtering, concentrating, and crystallising.

It occurs as a white, odourless, crystalline powder, with a sweetish, saline taste. Soluble in water (1 in 20) and in alcohol. The salt is decomposed on heating, giving off inflammable vapours and an odour of phenol, and leaving a residue of strontium carbonate. It should respond to the usual tests for strontium, and give off an odour of methyl salicylate on heating 2 decigrams with 1 mil of concentrated sulphuric acid, and 1 mil of methyl alcohol, added drop by drop.

It should be free from heavy metals, and not contain more than traces of barium (see *Strontii Bromidum*).

Strontium salicylate is an intestinal antiseptic, and has been recommended in gout and rheumatism.

*Dose*.— $\frac{1}{4}$  to 1 gramme (5 to 15 grains).

## STROPHANTHI SEMINA.

STROPHANTHUS SEEDS.

*Synonym*.—*Strophanthus*.

*Strophanthus* seeds are obtained from *Strophanthus Kombé*, Oliver (N.O. Apocynaceæ), a climbing plant indigenous to eastern tropical Africa. The fruit of the *strophanthus* consists of two large elongated, divergent follicles, with fleshy pericarp; these, deprived of their epicarp and mesocarp and dried, are sometimes imported. They contain numerous seeds, each provided with a long awn terminating in a beautiful, feathery plume. The following are the chief varieties of *strophanthus* seed, other than those of *S. Kombé*, that have been met with in commerce:—(1) *S. hispidus*, DC.; these are smaller than the genuine, brownish in colour, bear scattered hairs, and give with sulphuric acid a green reaction; they contain *strophanthin*. (2) *S. Courmonti*, Sacleux; these usually have a brownish tinge, but sometimes closely resemble the official, from which, however, they may be distinguished by their smaller size, more lanceolate shape, less bitter taste, abundant, prismatic crystals of calcium oxalate in the seed-coat, and by the red reaction with sulphuric acid. (3) *S. Nicholsoni*, E. M. Holmes; the seeds are whitish and woolly, the hairs project beyond the apex of the seed, and the reaction with sulphuric acid is red. (4) *S. gratus*, Baill.; the seeds are brown and glabrous, they give a red reaction with sulphuric acid, and contain the glucoside ouabaine, identical with that found in the wood of *Acokanthera Schimperi*, and much more toxic than *strophanthin*. (5) *S. Emini*, Aschers; the seeds are greyish-green, contain cluster-crystals of calcium oxalate, and give a red reaction.

The dried, ripe seeds are usually imported deprived of their awns and plumes. They are then oval and acuminate, about 15 millimetres long and 4 millimetres broad, of a greyish or greenish-fawn colour, and covered with silvery, appressed hairs directed towards the apex. They are flattened, narrowed towards the base, and provided on one side with a longitudinal ridge running from the centre to the apex of the seed. The transverse section shows a whitish, oily kernel, consisting of two straight cotyledons surrounded by a narrow endosperm. The odour, especially of the crushed seeds, is characteristic, the taste very bitter. A transverse section moistened with sulphuric acid (preferably 80 per cent. strength) assumes, at least in the endosperm, but sometimes in the cotyledons as well, a fine, green colour. The seed-coats, examined under the microscope, are seen to be free from crystals of calcium oxalate.



The seeds contain from 2 to 3 per cent. of a crystalline glucoside, named strophanthin, together with about 25 per cent. of fixed oil. Strophanthin yields, on hydrolysis with a dilute mineral acid, strophanthidin. The drug also contains kombic acid, choline, and trigonelline, and leaves about 4 per cent. of ash on incineration.

The properties of strophanthus seeds are virtually those of the glucoside strophanthin (see Strophanthin), but the tincture or extract of the seeds is generally preferred to the active principle. They are used in place of digitalis when a heart action only is required and the tension of the pulse is already high. In mitral disease, with failure of compensation, in the cardiac weakness of pneumonia and other acute illnesses, strophanthus is of especial value, and it frequently succeeds when digitalis fails. Strophanthus may be standardised by determining the minimal lethal dose for a certain weight of heart. One-quarter minim of the official tincture should be sufficient to arrest the heart of a frog weighing 20 grammes in systole in about one hour. The tincture is the most generally used preparation of strophanthus; it is extremely rapid in its action, and should be given in small doses, 1 to 3 decimils (2 to 5 minims); the official dose is considered to be too large. Extract of strophanthus is used in pills when a slower and more prolonged action is desired. In case of poisoning by strophanthus, apply the stomach-pump, or give emetics, followed in either case by an aqueous solution of gallic or tannic acid, and stimulants. The heart becomes very rapid, beats are dropped, and later it becomes uncountable, entering into the condition known as "delirium cordis." Death occurs suddenly. Everything should be done likely to depress the increased irritability of the heart; perhaps inhalations of chloroform are most likely to be successful.

*Dose.*—3 to 6 centigrams ( $\frac{1}{2}$  to 1 grain).

*NOTES.*—The commercial drug is not unfrequently mixed with the seeds of other species of strophanthus; the genuine seeds are best recognised by their greenish or fawn colour, by the hairs, which are satiny, not woolly, by the absence of calcium oxalate from the embryo, and almost total absence from the seed-coat, and by the green reaction with sulphuric acid.

## STROPHANTHINUM.

### STROPHANTHIN.



Strophanthin,  $\text{C}_{40}\text{H}_{66}\text{O}_{19}$ , is a glucoside obtained from the seeds of *Strophanthus Kombé*, Oliver (N.O. Apocynaceæ), and other species. It may be isolated from the freshly powdered seeds by extracting first with ether or carbon bisulphide to remove fat, and then with 70 per cent. alcohol, distilling off the latter, dissolving the residue in water, and filtering. To the filtrate tannic acid is added, but an excess must be avoided as the precipitate is soluble in excess; the precipitate is washed and then mixed with lead oxide, dried, and extracted with

alcohol. To this alcoholic solution a considerable volume of ether is added and the separated strophanthin collected, and dried *in vacuo*.

It occurs in the form of a pale yellow, amorphous powder, or as a white, microcrystalline powder containing varying amounts of water of crystallisation, having an intensely bitter taste and a faintly acid reaction; very poisonous. Freely soluble in water and in alcohol; almost insoluble in ether, chloroform, benzene, or carbon bisulphide; slightly soluble in acetone; very slightly soluble in amyl alcohol, which extracts it in small quantity from aqueous solution. The aqueous solution is optically inactive and neutral to litmus paper. Melting-point,  $170^{\circ}$  to  $172^{\circ}$ ; on complete ignition the strophanthin burns without leaving any residue. The air-dried substance contains three molecules of water of crystallisation, which, on heating, is given off, but not without decomposition of the glucoside. The anhydrous substance is said to melt at  $167^{\circ}$ . With concentrated sulphuric acid it is immediately coloured green to orange, then quickly red to red-brown, and on warming dark brown and finally green. If to an aqueous solution a trace of ferric chloride and a few mils of sulphuric acid be added, a red-brown precipitate will be produced, turning dark green after one or two hours. On heating with diluted mineral acids (about 10 per cent.) various shades of a green colour, changing to violet or blue are produced, and are more or less characteristic. Strophanthin is precipitated from its solutions by tannic acid. Concentrated hydrochloric acid dissolves it, making a colourless solution which, later, assumes a greenish shade, and on warming a yellowish-green colouration, finally with separation of the coloured products. A solution of phenol in strong sulphuric acid dissolves it, on warming, with a violet colouration, later becoming green.

By decomposition with mineral acids the glucoside is split up into strophanthidin,  $C_{26}H_{38}O_7$  (insoluble in water or ether, but easily soluble in alcohol and acetone; melting-point,  $169^{\circ}$  to  $170^{\circ}$ ), and strophanthobiose methyl ether,  $C_{12}H_{21}O_{10}CH_3$ .

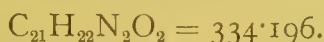
Strophanthin acts on the heart similarly to digitalis, but whilst digitalis produces marked peripheral vaso-constriction, strophanthin is almost without this action. It is absorbed more rapidly, is non-cumulative, and is less likely to produce gastro-intestinal irritation than digitalis. It is a more efficient diuretic, as it raises blood pressure without producing constriction of the renal vessels, so that more blood passes through the kidneys. It is an extremely powerful poison, arresting the action of the heart in systole; commercial specimens of the active principle vary in toxicity, and it should be used with great caution. Strophanthin is rarely employed, on account of its variable but usually great toxicity. A solution in distilled water (1 in 1000), freshly prepared, is used by hypodermic injection (see also *Strophanthi Semina*). In cases of poisoning by strophanthin, apply the same treatment as in the case of strophanthus seeds.

*Dose.*— $\frac{1}{5}$  to  $\frac{1}{3}$  milligram ( $\frac{1}{300}$  to  $\frac{1}{200}$  grain).

NOTES.—Pseudo-strophanthin,  $C_{40}H_{60}O_{16}$ , is a glucoside which has been isolated from an undetermined variety of strophanthus seeds, but is not present in *Strophanthus Kombé*. It melts at  $179^{\circ}$ , is slightly lævo-rotatory, and gives a red colouration with sulphuric acid. It is hydrolysed on boiling with weak hydrochloric acid. It differs from strophanthin both chemically and physiologically, and is nearly twice as toxic. It is probably identical with ouabaine obtained from *S. gratus*, Baill.

## STRYCHNINA.

### STRYCHNINE.



Strychnine,  $C_{21}H_{22}N_2O_2$ , is the chief alkaloidal constituent of the seeds of *Strychnos Nux-vomica*, Linn. (N.O. Loganiaceæ), *Strychnos Ignatii*, Bergius, and various other species of *Strychnos*. It may be obtained from the crushed, dried, ripe seeds by boiling and exhausting with very dilute hydrochloric acid, concentrating the solution, adding milk of lime, and exhausting with boiling alcohol, from which on cooling the strychnine is deposited; or the exhaustion may be effected by means of alcohol, the alcohol removed by distillation, the residue dissolved in acidulated water, colouring and other matter removed by lead acetate and filtered out, the filtrate, after removal of lead by hydrogen sulphide, concentrated, and mixed with lime or magnesia, by which the strychnine is liberated; the collected precipitate and excess precipitant is exhausted with boiling alcohol, and the alkaloid separated by fractional crystallisation. For the further purification of the alkaloid 11 parts of the finely powdered base are mixed with 60 parts of boiling water, and diluted nitric acid added, little by little, until a neutral or only slightly acid solution is obtained. From this solution the greater part of the salt separates on cooling, the remainder being obtained from the mother liquor on a second crystallisation. The alkaloid may be precipitated from an aqueous solution of the nitrate thus obtained, by ammonia, and then recrystallised from boiling alcohol.

It occurs in the form of translucent, trimetric, colourless prisms, or as a white, crystalline powder, inodorous, and having an extremely bitter, afterwards metallic taste; anhydrous, very poisonous. Very slightly soluble in cold water (about 1 in 7000), in boiling water (1 in 2500), in cold alcohol (1 in 170), in boiling alcohol (1 in 12), in cold absolute alcohol (1 in 350), in boiling absolute alcohol (1 in 40), in chloroform (1 in 6), in benzene (1 in 160), nearly insoluble in ether. The aqueous solution is intensely bitter, the bitterness being discernible in a solution 1 in 700000. The solutions are lævo-rotatory, and alkaline in reaction. Melting-point,  $265^{\circ}$  to  $266^{\circ}$ . On ignition strychnine burns without leaving any residue (absence of mineral impurities). It dissolves in concentrated sulphuric acid to form a colourless solution (absence of readily carbonisable organic impurities) which, when stirred with a crystal of potassium bichromate, acquires an intense violet colouration, quickly changing through red to yellow. This test is interfered with by organic matter, such as sugar and other impurities, and in analytical work the alkaloid must be purified



by suitable means before applying the test. On warming with diluted nitric acid it gives a faint pink solution, which becomes scarlet on adding a particle of potassium chlorate. With strong, cold, nitric acid not more than a faint pink colouration should be produced (limit of brucine). With concentrated sulphuric acid containing  $\frac{1}{20000}$  part of potassium permanganate a trace of strychnine produces a violet colouration. Strychnine is precipitated by potassium hydroxide from its acid solutions, but an excess of the alkali does not dissolve it; ammonia, however, forms a precipitate soluble in excess, but crystallising out after a time. The salts, or slightly acid solutions of the alkaloid, are precipitated by the usual alkaloidal reagents in very dilute solutions. Bismuth-potassium iodide gives a brown precipitate, 1 in 250000; potassio-mercuric iodide a white precipitate, 1 in 150000; picric acid a yellow crystalline precipitate, 1 in 20000; potassium ferrocyanide a white crystalline precipitate, 1 in 100000; solution of iodine in potassium iodide gives a reddish-brown precipitate, 1 in 100000; this last precipitate is soluble in alcohol, from which it may be recovered in characteristic microscopic crystals on slow evaporation. Concentrated hydrochloric acid has no effect upon the alkaloid. Fused with potassium hydroxide strychnine yields quinoline and indole. Continued heating of the solution in concentrated sulphuric acid at  $100^{\circ}$  produces strychnine monosulphonic acid,  $C_{21}H_{22}N_2O_2HSO_3$ .

Strychnine has the action of a bitter in the mouth, increasing the appetite and so augmenting the flow of gastric juice. It is rapidly absorbed as it reaches the intestines, the alkaloid and its salts more readily so than the crude preparations of *nux vomica*. After absorption, strychnine exerts its characteristic effects upon the central nervous system. Through its action on the sensory portion of the cord, the reflexes are exaggerated, and the normal tonus of striped muscle increased. The medulla is similarly affected, the ordinary afferent stimuli producing exaggerated effects, so that the movements of respiration are deepened and quickened, peripheral vessels are constricted through stimulation of the vaso-motor centre, and the heart slowed through excitation of the vagal centre. The sense organs are stimulated, so that the senses of smell, touch, hearing and vision are rendered more acute. The blood pressure is raised by the vaso-constriction produced, so that strychnine improves the pulse and is a valuable tonic to the circulatory system in cardiac failure. On account of its action in augmenting the reflexes of the cord, strychnine is an aphrodisiac in the male and an emmenagogue in the female. It reflexly increases the tonus of plain muscle, and also has a direct stimulant effect, so that it is of value in such conditions as chronic constipation, atony of the bladder, etc. Strychnine is excreted very slowly, and its action is therefore cumulative. It is much used as a gastric tonic in dyspepsia, and as a general tonic in convalescence from acute disease. The solution of the hydrochloride is given in mixture form, often with mineral acids, or pills may be prepared by carefully triturating the alkaloid with milk sugar

and massing with syrup of glucose. It is added to aperient pills to increase peristalsis, but preparations of *nux vomica* are often preferred for this purpose (see *Nux Vomica*). It is used in surgical shock and in cardiac failure, large doses, up to 6 milligrams ( $\frac{1}{10}$  grain), being given by hypodermic injection. It is used as an antidote in chloral and chloroform poisoning. In cases of poisoning by strychnine, emetics or the stomach-pump should be used, and tannin or potassium permanganate administered to render the strychnine inactive. The convulsions are controlled by chloroform anæsthesia, or by large doses of chloral or bromide. The administration of urethane in large doses (10 to 20 grammes) is considered of value as an antidotal measure.

*Dose*.—1 to 4 milligrams ( $\frac{1}{80}$  to  $\frac{1}{15}$  grain).

### STRYCHNINÆ FORMAS.

#### STRYCHNINE FORMATE.



Strychnine formate,  $\text{C}_{21}\text{H}_{22}\text{N}_2\text{O}_2, \text{HCOOH}, 2\text{H}_2\text{O}$ , may be obtained by dissolving strychnine in a solution of formic acid, and crystallising by allowing the solution to evaporate spontaneously. It contains 80.29 per cent. of strychnine, 11.05 per cent. of formic acid, and 8.65 per cent. of water.

It occurs in the form of a white, crystalline powder, composed of small, acicular crystals, somewhat efflorescent. Soluble in water (about 1 in 5) and in alcohol. The water of crystallisation cannot be determined by direct drying, as the salt loses both water and formic acid at  $100^\circ$ .

Strychnine formate is employed with other formates in the preparation of compound syrups and elixirs.

*Dose*.— $1\frac{1}{2}$  milligrams ( $\frac{1}{40}$  grain).

### STRYCHNINÆ HYDROCHLORIDUM.

#### STRYCHNINE HYDROCHLORIDE.



*Synonym*.—Hydrochlorate of Strychnine.

Strychnine hydrochloride,  $\text{C}_{21}\text{H}_{22}\text{N}_2\text{O}_2, \text{HCl}, 1\frac{1}{2}\text{H}_2\text{O}$ , may be prepared by suspending 5 of finely powdered strychnine in 50 of hot water and adding diluted hydrochloric acid (about 2.2 of 25 per cent. acid) until a perfectly neutral solution is obtained. The solution is filtered, if necessary, and evaporated on a water-bath until a drop, placed on a cold glass plate, crystallises. The amount of water of crystallisation is officially given as two molecules, but the evidence available is distinctly in favour of one and a-half molecules, and on this basis the salt contains 84.03 per cent. of the alkaloid strychnine, 9.16 per cent. of hydrochloric acid, and 6.79 per cent. of water of crystallisation.

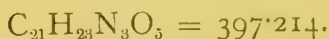
It occurs in small, colourless, trimetric prisms, or white, silky, crystalline needles, which are odourless, and have an intensely bitter taste; permanent in air. Soluble in water (1 in 35.5), in alcohol (1 in 73), insoluble in ether. The solutions are neutral to litmus paper and are lævo-rotatory. From the aqueous solution hydrochloric acid deposits crystals of the neutral salt, owing to its insolubility in the free acid. Heated to  $135^{\circ}$  it loses its water of crystallisation and is not decomposed, even at a temperature of  $150^{\circ}$ . The salt should respond to the tests for strychnine, and should be free from sulphates. With platinum chloride it forms a yellowish-white precipitate of the platinum salt, almost insoluble in water and separating from hot diluted alcohol in mosaic gold crystals.

Strychnine hydrochloride has all the properties of the pure alkaloid (see Strychnina). It is given usually as *Liquor Strychninæ Hydrochloridi* in mixture form, this solution being best prescribed in acid mixtures; if dispensed with sodium bicarbonate, spirit of sal volatile, Fowler's solution or other alkaline substances, precipitation of strychnine may occur. The official solution may be used for hypodermic injection, or a solution (1 per cent.) may be prepared for this purpose without alcohol. Alkalies and their carbonates, solution of sodium arsenate, Fowler's solution, bromides, and iodides are incompatibles of this salt. If more than 8 minims of a 1 per cent. solution to 1 fluid ounce of water be prescribed with alkalies, the strychnine is liable to precipitation.

*Dose.*—1 to 4 milligrams ( $\frac{1}{60}$  to  $\frac{1}{15}$  grain).

## STRYCHNINÆ NITRAS.

STRYCHNINE NITRATE.



Strychnine nitrate,  $\text{C}_{21}\text{H}_{22}\text{N}_2\text{O}_2, \text{HNO}_3$ , may be prepared by suspending 5 of strychnine in 50 of hot, distilled water, and dissolving with sufficient diluted nitric acid to make a neutral solution, concentrating and crystallising.

It occurs in colourless, glistening, needles, which are odourless, and have an intensely bitter taste. Soluble in water (1 in 63), alcohol (1 in 120), and glycerin, and slightly soluble in chloroform. When heated the salt decomposes without melting, and when ignited it is consumed without leaving any residue. The salt should respond to the tests for strychnine. Its aqueous solutions are neutral to litmus and lævo-rotatory.

Strychnine nitrate is used for similar purposes to the hydrochloride. An aqueous solution (1 in 100) is administered as a hypodermic injection in doses of 1 to 4 decimils (2 to 6 minims).

*Dose.*—1 to 4 milligrams ( $\frac{1}{60}$  to  $\frac{1}{15}$  grain).



**STRYCHNINÆ SULPHAS.****STRYCHNINE SULPHATE.**

Strychnine sulphate,  $(\text{C}_{21}\text{H}_{22}\text{N}_2\text{O}_2)_2\text{H}_2\text{SO}_4, 5\text{H}_2\text{O}$ , may be prepared by adding strychnine, in powder, in slight excess to warm, diluted sulphuric acid, filtering, concentrating, and crystallising.

It occurs in colourless, odourless crystals, or as a white, crystalline powder, and has an intensely bitter taste, even in solutions of 1 in 700000. Soluble in water (1 in 48), and in alcohol (1 in 135), but only slightly soluble in chloroform, and insoluble in ether. The salt loses its water of crystallisation when heated at  $100^\circ$ , and melts at  $200^\circ$ ; it leaves no residue or ignition. It should respond to the tests for strychnine.

Strychnine sulphate is used for similar purposes to the hydrochloride. An aqueous solution (1 in 100) is administered as a hypodermic injection in doses of 6 to 24 centimils (1 to 4 minims).

*Dose.*—1 to 4 milligrams ( $\frac{1}{60}$  to  $\frac{1}{15}$  grain).

**STUPA CARBOLISATA.****CARBOLISED TOW.**

Carbolic Acid, in crystals	...	...	...	5.00
Methylated Ether (specific gravity, 0.720)	...	...	...	100.00
Jute Tow, dried...	...	...	...	95.00

Dissolve the carbolic acid in the ether and proceed as described under Gossypium Carbolisatum. The strength of the product should be about 6 per cent.

Carbolised tow is used as an antiseptic dressing for wounds.

**STUPA CARBOLISATA COMPOSITA.****COMPOUND CARBOLISED TOW.**

Jute Tow, dried	...	...	...	86.00
Tar	...	...	...	4.00
Carbolic Acid	...	...	...	10.00
Methylated Ether	...	...	...	100.00

Dissolve the carbolic acid and tar in the ether, saturate the tow evenly with the liquid under pressure, dry by exposure to air, and preserve in well-closed cartons. The strength of the product should be about 10 per cent.

This tow is used as an antiseptic dressing for wounds.

**STUPA STYPTICA.****STYPTIC TOW.**

*Synonym.*—Tarred Tow.

Jute Tow, dried...	...	...	...	88.00
Resin	...	...	...	2.00
Tar	...	...	...	10.00
Benzol	...	...	...	70.00

Mix the tar and resin with the benzol, allow the mixture to rest in a closed vessel for twenty-four hours, then decant the solution from the insoluble matter. Saturate the tow evenly with the solution, and dry by exposing it in loose layers so that the air may have free passage. When dry wrap in parchment paper.

## STYRAX PRÆPARATUS.

PREPARED STORAX.

*Synonym.*—Styrax.

Prepared storax is a balsam obtained from the trunk of *Liquidambar orientalis*, Miller (N.O. Hamamelideæ), a tree indigenous to the south-west of Asiatic Turkey. The secretion of storax, which is not a normal production of the tree, is induced by beating the bark. The injury thus inflicted on the cambium results in the formation of numerous oleoresin ducts in which the balsam is secreted and from which it is discharged into the wounded bark. The latter is then removed and the balsam separated by pressing, boiling with water, again pressing, and finally separating from the aqueous layer. Thus obtained it forms an opaque, greyish, viscid liquid, which by standing separates into a supernatant, aqueous liquid and a dark brown, oleo-resinous layer; it contains about 20 to 30 per cent. of water, together with fragments of bark, etc. From these it is purified by solution in alcohol, filtration, and evaporation.

The purified balsam is a translucent, brownish-yellow semi-liquid, with a strong, aromatic odour and taste. It is rendered more fluid by heating, but should give off no moisture. When it is boiled with solution of potassium bichromate and sulphuric acid, benzaldehyde is formed and gives off an odour resembling that of essential oil of bitter almonds. Prepared storax is completely soluble in alcohol, ether, chloroform, carbon bisulphide, and glacial acetic acid. It yields on incineration less than 1 per cent. of ash.

The balsam is composed of a resin mixed with an oily liquid. The resin consists of storesinol, partly free and partly combined with cinnamic acid. The oily liquid contains styrol, ethyl cinnamate, phenyl-propyl cinnamate, cinnamyl cinnamate (styracin), vanillin, and free cinnamic acid. The specific gravity at 100° is 1.109 to 1.114. Cold petroleum spirit extracts about 25 to 45 per cent., and the acid number of the extract is low (40 to 60), whereas if coniferous resin is present the extract is larger in quantity and the acid number rises (to 100 or even more); the ester value of the petroleum spirit extract is 124 to 160.

Prepared storax closely resembles balsam of peru in its action. An ointment (1 part in 4 parts of benzoated lard) is used as a parasiticide in scabies and other parasitic skin affections.

**SUCCUS ACALYPHÆ.**

## ACALYPHA JUICE.

Acalypha juice is prepared by subjecting the bruised, fresh herb, *Acalypha indica*, Linn., to pressure, adding to the expressed juice sufficient alcohol to increase the volume of liquid by one-third, allowing the mixture to stand for seven days, and filtering.

This juice is official in India and the Eastern Colonies, where it is used as an emetic and expectorant.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

**SUCCUS ADHATODÆ.**

## ADHATODA JUICE.

Adhatoda juice is obtained by subjecting the bruised, fresh leaves of *Adhatoda vasica*, Nees, to pressure, the expressed juice being subsequently strained.

This juice is official in India and the Eastern Colonies, where it is used as an expectorant in bronchitis and asthma.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

**SUCCUS BELLADONNÆ.**

## BELLADONNA JUICE.

Belladonna juice is prepared by subjecting the bruised fresh leaves and young branches of *Atropa Belladonna*, Linn., to pressure, adding to the expressed juice one-third its volume of alcohol, allowing the mixture to stand for seven days, and filtering.

Average samples of belladonna juice contain about 0.03 per cent. of total alkaloid, and this preparation is therefore rather weaker than *Tinctura Belladonnæ*.

*Dose.*—3 to 10 decimils (5 to 15 minims).

**SUCCUS BOVINUS.**

## BEEF JUICE.

*Synonym.*—*Succus Bovillus*.

Beef juice is prepared from fresh, lean beef, free from fat. The beef is thinly sliced, and subjected to pressure, the juice collected, and the pressure increased as the liquid ceases to flow.

The juice prepared as described contains about 8 per cent. of coagulable proteid. It should be freshly prepared as required, and the residue left after extracting the juice may be employed in making beef tea, as it still contains much nutriment, which can be extracted by treatment with water.

Beef juice is used as a nutritive and gastric stimulant for invalids; 10 or 15 drops may be given, with three or four meals of the day, to infants. It should not be mixed with hot liquids.



**SUCCUS CONII.**

## CONIUM JUICE.

*Synonym.*—Hemlock Juice.

Conium juice is prepared by subjecting the bruised, fresh leaves and young branches of *Conium maculatum*, Linn., to pressure, adding to the expressed juice one-third its volume of alcohol, allowing the mixture to stand for seven days, and filtering.

This juice varies considerably in strength, different samples yielding from 0.012 to 0.062 per cent. of total alkaloidal hydrochlorides. It is used chiefly to make Unguentum Conii and Vapor Coniinae. For both preparations the standardised liquid extract of conium would be more suitable.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**SUCCUS DIGITALIS.**

## DIGITALIS JUICE.

Digitalis juice is prepared by subjecting to pressure the bruised, fresh leaves of *Digitalis purpurea*, Linn., adding to the expressed juice one-third its volume of alcohol, allowing the mixture to stand for seven days, and filtering.

It is an active preparation of the drug, and is reputed not to cause nausea.

*Dose.*—3 to 6 decimils (5 to 10 minims).

**SUCCUS HYOSCYAMI.**

## HYOSCYAMUS JUICE.

Hyoscyamus juice is prepared by subjecting the bruised, fresh leaves, flowering tops, and young branches of *Hyoscyamus niger*, Linn., to pressure, adding to the expressed juice one-third its volume of alcohol, allowing the mixture to stand for seven days, and filtering.

It is of fairly constant strength, approximating to 0.005 per cent. of total alkaloids.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**SUCCUS LIMONIS.**

## LEMON JUICE.

Lemon juice is obtained from the ripe fruit of *Citrus medica*, Linn., var.  $\beta$  *Limonum*, Hook. f., by expression.

It occurs as a slightly turbid, acid, yellowish liquid. Specific gravity, 1.03 to 1.04. It should contain from 7 to 9 grammes of citric acid in 100 mils, and should not yield more than 3 per cent. of ash when evaporated to dryness and incinerated. For neutralisation 100 of lemon juice will require about 11.4 of potassium bicarbonate, 9.5 of sodium bicarbonate, or 16.5 of sodium carbonate.

Lemon juice is very prone to fermentation, and should be freshly prepared. It may be preserved by the addition of 10 per cent. of alcohol. Lemon juice well diluted is a cooling and refreshing beverage in febrile conditions. It is given in effervescence with alkali bicarbonates as an antacid drink, and for the sedative effect upon the stomach of the evolved carbonic acid gas. It is also used as a preventive of scurvy.

*Dose.*—30 to 60 mls (1 to 2 fluid ounces).

### SUCCUS RHAMNI.

#### BUCKTHORN JUICE.

Buckthorn juice is obtained from the fruit of the common buckthorn, *Rhamnus cathartica*, Linn. (N.O. Rhamneæ), the berries being expressed when ripe. The juice is a dark reddish-purple liquid, with a fragrant odour. It is very liable to ferment.

This juice is used only in the form of Syrupus Rhamni, and is now rarely employed except in veterinary medicine.

### SUCCUS SCOPARII.

#### BROOM JUICE.

Broom juice is prepared by subjecting the bruised, fresh tops of *Cytisus Scoparius*, Link, to pressure, adding to the expressed juice one-third its volume of alcohol, allowing the mixture to stand for seven days, and filtering.

This juice is of fairly constant strength, containing the equivalent of about 0.162 per cent. of alkaloid, reckoned as hydrochloride.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

### SUCCUS TARAXACI.

#### TARAXACUM JUICE.

Taraxacum juice is prepared by subjecting the bruised, fresh root of *Taraxacum officinale*, Wiggers, to pressure, adding to the expressed juice one-third its volume of alcohol, allowing the mixture to stand for seven days, and filtering.

This juice is considered by many practitioners to be more active than the liquid extract prepared from the dried root.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

NOTE.—Liquor Taraxaci is prepared by adding the alcohol to the bruised, fresh root before expression; it closely resembles Succus Taraxaci.

### SULPHONALUM.

#### SULPHONAL.



*Synonyms.*—Diethylsulphon-dimethylmethane; Sulphonmethanum; Sulphonmethane.

Sulphonal,  $(\text{CH}_3)_2\text{C}(\text{SO}_2\text{C}_2\text{H}_5)_2$ , may be prepared by passing dry hydrochloric acid gas into a mixture of anhydrous acetone and

anhydrous mercaptan, whereby mercaptol,  $(\text{CH}_3)_2\text{C}(\text{SC}_2\text{H}_5)_2$ , is produced; this product, which is an oily liquid of very disagreeable odour, is purified by washing first with water and then with diluted solution of sodium hydroxide; it is then oxidised by shaking with a 5 per cent. solution of potassium permanganate added until the colour of the latter is permanent, and the resulting sulphonol is purified by recrystallisation from water or alcohol.

It occurs in the form of colourless, prismatic crystals, or as a white, crystalline powder, odourless, almost tasteless, permanent in air. Soluble in cold water (1 in 500), in boiling water (1 in 15), in cold alcohol (1 in 50), more soluble in hot alcohol; in chloroform (1 in 3), in ether (1 in 90), in benzene (1 in 11), in petroleum ether (about 1 in 1000). The aqueous solution is neutral to litmus paper. Its solution in boiling water should develop no odour of mercaptan or mercaptol, and, after cooling and separation of the crystals, should give no reaction with the tests for sulphates or chlorides. Melting-point,  $125^\circ$  to  $126^\circ$ ; boiling-point,  $300^\circ$ . On ignition it burns with a luminous flame, evolving the odour of sulphur dioxide, and leaving no residue (absence of mineral impurity). If a mixture of sulphonol with an equal weight of potassium cyanide be carefully fused the odour of mercaptan is evolved, and when to the solution of the product in water excess of hydrochloric acid is added, a few drops of solution of ferric chloride will produce a red colouration due to potassium thiocyanate formed during fusion. If a mixture of sulphonol and 3 parts of potassium hydroxide be fused, it becomes yellow, then red, and on dilution with water a blue colouration results, which, on addition of excess of hydrochloric acid, turns a transient violet, and sulphur is separated. Heated with an equal bulk of powdered charcoal in a dry test-tube, the characteristic odour of mercaptan is evolved. Heated with reduced iron, free from sulphide, it gives a garlic odour, forming at the same time ferrous sulphide, the addition of hydrochloric acid, after cooling, evolving hydrogen sulphide. Gently warmed with dried sodium acetate it evolves hydrogen sulphide. Heated with a few drops of sulphuric acid and a trace of phenol it passes quickly to emerald-green, giving off a strong sulphurous odour. Sulphonol is a very stable body and is scarcely affected by acids or alkalis, even when boiling, or by oxidising agents. It dissolves in concentrated sulphuric acid, forming a solution from which the sulphonol is reprecipitated on the addition of water. A saturated aqueous solution at  $15^\circ$  should be without action on a 1 per mille solution of potassium permanganate.

Sulphonol is a pure hypnotic, possessing no analgesic properties; it is therefore employed in simple insomnia, when pain is absent. Its action is due to the molecule as a whole, and is not dependent upon any decomposition occurring in the body. It is absorbed very slowly on account of its insolubility, and the dose should therefore be administered three or four hours before its hypnotic effect is desired. It is excreted even more slowly, and successive doses may have a



cumulative effect and give rise to symptoms of poisoning. The hypnotic effect may also be prolonged, so that there is drowsiness the day following its administration. Continued use of sulphonal may give rise to hallucinations, gastritis, and to the destruction of hæmoglobin in the blood with the appearance of hæmatoporphyrin in the urine, which acquires a cherry-red colour. This tendency to cumulate and to produce hæmatoporphyrinuria renders this drug one of the most dangerous hypnotics for anything but occasional use. Sulphonal is best dispensed in the form of mixture, suspended with compound tragacanth powder; the dose should be added to hot water—with or without a little spirit—at the time of taking. Taken in this way its action is more rapid, and a smaller dose suffices. It may also be dispensed as a powder to be swallowed with hot water, or it may be enclosed in a cachet. In cases of poisoning by sulphonal, alkaline liquids should be given freely to aid excretion.

*Dose.*— $\frac{1}{2}$  to 2 grammes (10 to 30 grains).

NOTES.—The urine of patients taking sulphonal has a distinct reducing action on Fehling's solution. Such urine, however, is slightly lævo-rotatory, while diabetic urine is dextro-rotatory. Sulphonal is readily distinguished from the allied bodies, methylsulphonal (Trional) and ethylsulphonal (Tetronal), by its higher melting-point and its crystalline form.

## SULPHUR LOTUM.

WASHED SULPHUR.

S = 32.06.

Washed sulphur is prepared by digesting 10 of sublimed sulphur with 7 of water and 1 of solution of ammonia for twenty-four hours, with occasional agitation, after which it is thrown on a filter, and washed with water until the washings are perfectly neutral. The washed sulphur is then pressed, thoroughly dried at a moderate heat, and passed through a fine sieve.

It occurs as a bright greenish-yellow, tasteless, and odourless powder, the characters of which accord with those of Sulphur Sublimatum, except that the washed preparation is free from all traces of arsenium and free acid. Unless it has been thoroughly dried after washing it slowly oxidises and again becomes acid.

Washed sulphur is now rarely employed. Its properties resemble those of precipitated and sublimed sulphur.

*Dose.*— $1\frac{1}{2}$  to 4 grammes (20 to 60 grains).

## SULPHUR NIGRUM.

BLACK SULPHUR.

*Synonyms.*—Sulphur Vivum; Crude Sulphur; Sulphur Griseum; Horse Brimstone; Sulphur Caballium.

Black sulphur was formerly the grey or mouse-coloured, crude natural sulphur obtained from Sicily, but the name is now applied to

the residuum from the subliming pots used in the preparation of flowers of sulphur, or to a mixture of sublimed sulphur and wood charcoal.

It occurs as a dark grey or blackish powder, which resembles Sulphur Sublimatum in its general characters. If prepared from the residue left in subliming pots it may contain much arsenium.

Black sulphur is used chiefly in veterinary medicine.

*Dose.*— $1\frac{1}{2}$  to 4 grammes (20 to 60 grains).

## SULPHUR PRÆCIPITATUM.

PRECIPITATED SULPHUR.

S = 32.06.

*Synonym.*—Milk of Sulphur.

Precipitated sulphur may be prepared by boiling sublimed sulphur with calcium hydroxide and water for an hour or so, filtering, and decomposing the resulting complex mixture of calcium sulphides and thiosulphate by the addition of hydrochloric acid, diluted with an equal volume of water, added in a thin stream, and with constant stirring, until only a slight alkalinity remains. The precipitated sulphur is washed until the washings are tasteless and cease to give a precipitate with ammonium oxalate, and then dried rapidly at a moderate heat. By allowing the mixture to remain slightly alkaline any arsenium which may have been present in the sulphur or in the acid will remain in solution as a soluble thioarsenite.

It occurs as a greyish-white or whitish-yellow, fine, soft powder, smooth, amorphous, tasteless, free from grittiness, and from odour of hydrogen sulphide. Under the microscope it is seen to consist of opaque globules without any admixture of crystalline matter. Insoluble in water, very slightly soluble in absolute alcohol, soluble in benzene, petroleum benzin, oil of turpentine, ether, chloroform, and in boiling aqueous solutions of alkaline hydroxides; readily soluble in carbon disulphide, but on exposing the solution to light sulphur separates, owing to its conversion into the insoluble variety. Water with which it has been shaken should not affect litmus paper (absence of acid or alkali). Melting-point,  $115^{\circ}$ ; at a higher temperature it burns with a characteristic, blue flame, evolving sulphur dioxide, and finally volatilising without leaving any residue. On heating 1 gramme with a mixture of 2 mls of hydrochloric acid and 18 mls of water, and filtering, the filtrate should give no reaction with barium chloride (absence of sulphates), nor after neutralising with ammonia should it give any precipitate with ammonium oxalate (absence of calcium). On heating 1 gramme with 10 mls of water no odour of hydrogen sulphide should be evolved, and the filtrate should give no precipitate with silver nitrate (absence of chlorides), nor dark colouration with solution of lead acetate (absence of soluble sulphides). It should be free from

arsenium and pronounced acidity, and should respond generally to the chemical tests described under Sulphur Sublimatum.

Precipitated sulphur resembles sublimed sulphur in its general properties (see Sulphur Sublimatum). It is, however, owing to its amorphous condition, more readily changed to and absorbed as alkali sulphide, and is largely excreted in the urine as sulphate. It is given to children for its mild, laxative properties, mixed with milk, syrup, honey or treacle, or as Trochiscus Sulphuris. It is applied to the skin in acne and other skin affections as a lotion (see Lotio Sulphuris).

Lotions of precipitated sulphur with acetate of lead are employed to restore the colour of grey hair (see Lotio Plumbi et Sulphuris).

*Dose.*— $1\frac{1}{2}$  to 4 grammes (20 to 60 grains).

*NOTES.*—Lac Sulphuris is precipitated sulphur prepared by adding sulphuric acid to the alkaline solution obtained by boiling sulphur with slaked lime in water, and collecting the precipitate, which contains considerable quantities of calcium sulphate as an impurity. This preparation should not now be supplied when "Milk of Sulphur" is asked for.

## SULPHUR SUBLIMATUM.

SUBLIMED SULPHUR.

S = 32.06.

*Synonyms.*—Flowers of Sulphur; Flowers of Brimstone.

Sublimed sulphur may be prepared from native sulphur or sulphides (which are found most abundantly in volcanic countries, chiefly in Italy) by heating under suitable conditions so as to convert the sulphur into vapour, and condensing it, or by grinding lump sulphur to fine powder. On redistillation from iron retorts the vapour is condensed and run into moulds to form stick or roll sulphur (Sulphur Rotundum), or it is conducted into large, brick chambers, where it is deposited in the form of powder.

It occurs as a fine, bright yellow powder, gritty, odourless, and tasteless when perfectly pure, but medicinal sublimed sulphur, as met with in commerce, invariably has a distinctly characteristic odour and a faintly acid taste. Insoluble in water, slightly soluble in hot alcohol, ether, chloroform, more freely in benzene, oil of turpentine, fixed and volatile oils; readily in carbon bisulphide, also in glacial acetic acid. Shaken with water the latter gives an acid reaction with litmus. Specific gravity, about 2.03. It melts at about  $115^{\circ}$ , forming a yellow, mobile fluid, which, on further heating, becomes dark coloured and viscid, and finally boils at  $440^{\circ}$ , when it volatilises without leaving any residue. Exposed to moist air it becomes gradually oxidised with formation of sulphuric acid. Under the microscope it is seen to consist of almost opaque, irregular, rounded particles, without any appearance of crystalline matter. It burns with a blue flame with formation of sulphur dioxide. Shaken with solution of ammonia and filtered, the latter, on evaporation, should not leave any residue (absence of



arsenium sulphide). This is the official test ; but unless the sulphur has been recently washed it will contain more or less sulphuric acid, and a residue of ammonium sulphate will be obtained.

When taken internally, sulphur is partly absorbed as alkali sulphide from the intestine, the remainder being excreted in the fæces unchanged. Its action is entirely due to the sulphide formed, sulphur itself being an inert substance. It exerts a mild stimulant and antiseptic action in the intestine, it increases peristalsis and relaxes the bowels, producing a soft stool without causing pain or colic. The portion absorbed is excreted as sulphate in the urine ; small quantities are also excreted by the lungs and by the skin, giving a disagreeable odour to the breath and perspiration. During excretion sulphides increase the secretion of the bronchioles and skin. Sulphur is used as a laxative, often with senna (as in *Pulvis Glycyrrhizæ Compositus*), or with potassium acid tartrate, as in *Confectio Sulphuris* and *Trochisci Sulphuris*. It is prescribed for children, and is valuable in hæmorrhoids, the confection being frequently given mixed with confection of senna. It is much used in gout, chronic rheumatism, and chronic bronchitis. Externally, sulphur is used in the form of ointment and lotion as a mild antiseptic and parasiticide in scabies, acne, and other chronic skin diseases. A small proportion is converted into sulphide, which exerts a mild irritant effect. Burning sulphur is much employed as a disinfectant to prevent the spread of infectious diseases. For this purpose it is moulded into flat, circular cakes, which are provided with a wick. These are burnt in the room to be disinfected, the room being kept securely closed for some hours ; one pound of sulphur is used for each 1000 cubic feet of space. Metal work exposed to the action of the sulphur dioxide should be well greased, and coloured articles should be removed ;  $\text{SO}_2$  acts as a disinfectant only in the presence of water.

*Dose.*— $1\frac{1}{2}$  to 4 grammes (20 to 60 grains).

### SULPHURIS IODIDUM.

#### SULPHUR IODIDE.

Iodine	...	...	...	...	...	...	80.00
Sublimed Sulphur	...	...	...	...	...	...	20.00

Thoroughly mix together the iodine and sulphur, and gently heat the mixture in a loosely corked flask until the mass assumes a uniformly dark colour ; increase the temperature until liquefaction ensues ; then allow the mass to cool in the flask, remove the solidified product by breaking the flask, and reduce the sulphur iodide to fragments of a convenient size.

It occurs as a greyish-black, crystalline solid, with an odour resembling that of iodine. Insoluble in water, but soluble in glycerin (1 in 16), and more soluble in carbon bisulphide (1 in 4). The iodine is driven off as vapour on boiling the compound with water.

The action of sulphur iodide is virtually that of iodine ; it is employed as Unguentum Sulphuris Iodidi in acne rosacea, ringworm, and other parasitic diseases of the skin.

NOTE.—Sulphur iodide should be kept in a well-closed vessel.

### SUMBUL RADIX.

SUMBUL ROOT.

*Synonym.*—Sumbul.

Sumbul root is obtained from *Ferula Sumbul*, Hook. f. (N.O. Umbelliferæ), a native of Turkestan. The plant produces a large, fleshy root and a bristly rootstock, both of which are cut into transverse slices and dried.

The drug as imported consists chiefly of more or less cylindrical, sometimes tapering pieces, varying from 2.5 to 7.5 centimetres in diameter and 1.5 to 2.5 centimetres or more in thickness. They are provided with a thin, brown, papery cork, and are whitish, fibrous and spongy internally. The transverse section often shows spots of resin, but does not exhibit any well-defined structure. Many of the pieces are beset with coarse fibres derived from the remains of the leaf-bases, which sufficiently indicate that they are pieces of the rhizome, of which indeed the drug chiefly consists. The odour is strong and musky, the taste bitter and somewhat aromatic.

The chief constituent of sumbul root is from 0.2 to 0.4 per cent. of volatile oil (specific gravity, 0.954 to 0.964), but it also yields to petroleum spirit 17 per cent. of a yellow, viscid, fixed oil. In addition it contains umbelliferone in the free state, and yields about 6 per cent. of ash.

Sumbul is employed as a stimulant and antispasmodic in hysterical conditions, usually with preparations of valerian. It is used principally as tincture in mixture form.

### SUPPOSITORIA ACIDI CARBOLICI.

CARBOLIC ACID SUPPOSITORIES.

*Synonym.*—Phenol Suppositories.

					Each suppository contains
Carbolic Acid	...	...	...	6.70	1 grain
White Beeswax	...	...	...	13.40	2 grains
Oil of Theobroma, melted, sufficient to produce	...	...	...	100.00	

Melt the beeswax and oil of theobroma together at a low temperature, add the carbolic acid, dissolve, and divide into suppositories, each weighing about 1 gramme (15 grains).

These suppositories are used as an antiseptic application in hæmorrhoids and in pruritus ani.

NOTE.—These suppositories can be made without wax, care being taken to melt the oil of theobroma at as low a temperature as possible.

**SUPPOSITORIA ACIDI TANNICI.**

## TANNIC ACID SUPPOSITORIES.

					Each suppository contains
Tannic Acid	...	...	...	20'00	3 grains
Oil of Theobroma, sufficient to produce	...	...	...	100'00	

Mix the tannic acid thoroughly with a small quantity of the melted oil of theobroma; add the mixture to the remainder of the oil, stir well together, and divide into suppositories, each weighing about 1 gramme (15 grains).

Tannic acid suppositories are used as an astringent application in hæmorrhoids, extract of belladonna being sometimes added to allay pain.

**SUPPOSITORIA ADRENINÆ.**

## ADRENINE SUPPOSITORIES.

					Each suppository contains
Adrenine	...	...	...	0'10	$\frac{1}{60}$ grain
Boric Acid	...	...	...	0'20	
Distilled Water	...	...	...	3'00	$\frac{1}{30}$ grain
Wool Fat	...	...	...	10'00	
Oil of Theobroma, sufficient to produce	...	...	...	100'00	

Dissolve the boric acid in the distilled water, add the adrenine, dissolve, mix thoroughly with the wool fat, add the melted oil of theobroma, stir well together, and divide into suppositories, each weighing about 1 gramme (15 grains).

These suppositories are used for their constrictive action upon the hæmorrhoidal vessels. They arrest bleeding in hæmorrhoids and relieve congestion.

**SUPPOSITORIA BELLADONNÆ.**

## BELLADONNA SUPPOSITORIES.

					Each suppository contains
Alcoholic Extract of Belladonna	...	...	...	10'00	1'5 grains
Oil of Theobroma, sufficient to produce	...	...	...	100'00	

Mix the extract of belladonna thoroughly with a small quantity of the melted oil of theobroma, add the mixture to the remainder of the oil, stir well together, and divide into suppositories, each weighing about 1 gramme (15 grains).

Belladonna suppositories are used to allay pain.

NOTE.—Each suppository contains approximately 1 milligram ( $\frac{1}{31}$  grain) of the alkaloids of belladonna root.

**SUPPOSITORIA GLYCERINI.**

## GLYCERIN SUPPOSITORIES.

GLYCERIN SUPPOSITORIES.					Each suppository contains
Glycerin ... ..	...	...	...	70'00	70 per cent.
Gelatin, cut small	...	...	...	14'00	
Distilled Water, a sufficient quantity.					



Cover the gelatin with water in a weighed evaporating dish; allow it to stand for two minutes, pour off the excess of water, set aside until the gelatin is softened, add the glycerin, and heat on a water-bath until solution is effected; evaporate until the product weighs 100, and pour into moulds having a capacity of 2, 4, or 8 grammes (30, 60, or 120 grains). The suppositories should be prepared as required, and wrapped separately in tin-foil when cold.

Glycerin suppositories are used to evacuate the bowels. They absorb water from the tissues of the lower part of the rectum, increased peristalsis being set up reflexly by the irritation so produced. The suppositories are prepared to contain 1, 2, 4, or 8 grammes of the mass, the smaller sizes being used for infants and children, the larger for adults.

NOTE.—Suppositoria Glycerini, U.S.P., are prepared by dissolving 5 of mono-hydrated sodium carbonate in 5 of water, and heating the solution on a water-bath with 30 by weight of glycerin and 2 of stearic acid until effervescence ceases and the liquid is clear. The melted mass is then divided into suppositories, each of which should contain 3 grammes of glycerin.

### SUPPOSITORIA IODOFORMI.

#### IODOFORM SUPPOSITORIES.

Iodoform.,. . . . .	20'00	Each suppository contains 3 grains
Oil of Theobroma, sufficient to produce	100'00	

Mix the iodoform thoroughly with a small quantity of the melted oil of theobroma, add the mixture to the remainder of the oil, and divide into suppositories each weighing about 1 gramme (15 grains).

Iodoform suppositories are employed as a disinfectant and local anæsthetic in inflamed piles, anal fissure, prostatitis, etc.

### SUPPOSITORIA MORPHINÆ.

#### MORPHINE SUPPOSITORIES.

Morphine Hydrochloride	...	...	1'70	Each suppository contains $\frac{1}{4}$ grain
Oil of Theobroma, sufficient to produce	100'00			

Mix the morphine hydrochloride thoroughly with a small quantity of the melted oil of theobroma, add the mixture to the remainder of the oil, stir well together, and divide into suppositories each weighing about 1 gramme (15 grains).

Morphine suppositories are employed as a sedative to allay pain. The action of the morphine is exerted only after absorption.

### SUPPOSITORIA NUTRIENTIA.

#### NUTRIENT SUPPOSITORIES.

Beef Peptone	...	...	...	...	75'00
Gelatin	...	...	...	...	7'50
Distilled Water	...	...	...	...	17'50

Cover the gelatin with the water and allow to stand until the liquid is absorbed; then melt the gelatin at a low temperature, add the beef peptone, and divide into suppositories, each weighing 1, 2, or 4 grammes (15, 30, or 60 grains).

Nutrient suppositories are employed for rectal alimentation.

NOTES.—The proportion of gelatin required depends upon the consistence of the beef peptone and the amount of heat employed in the process. The greater the heat the more gelatin is required to give the necessary consistence.

## SUPPOSITORIA PEPTONATA.

### PEPTONE SUPPOSITORIES.

Peptone, in powder	...	...	...	34·00
Oil of Theobroma, sufficient to produce	...	...	...	100·00

Triturate the peptone with a small quantity of melted oil of theobroma, then add sufficient of the fat to produce the required weight, stir well and, as the mixture cools, pour it into moulds capable of holding 1, 2, or 4 grammes (15, 30, or 60 grains).

Peptone suppositories are employed for rectal alimentation. The smallest sized suppositories are intended for administration to infants and the larger for adults.

## SUPPOSITORIA PLUMBI COMPOSITA.

### COMPOUND LEAD SUPPOSITORIES.

Lead Acetate, in powder	...	...	20·00	Each suppository contains 3 grains 1 grain
Opium, in powder	...	...	6·70	
Oil of Theobroma, sufficient to produce	...	...	100·00	

Mix the opium and lead acetate thoroughly with a small quantity of the melted oil of theobroma, add the mixture to the remainder of the oil, stir well together, and divide into suppositories, each weighing about 1 gramme (15 grains).

These suppositories are applied as an astringent for hæmorrhoids, etc.

## SUPPOSITORIA RANUNCULUS FICARIÆ.

### PILEWORT SUPPOSITORIES.

Pilewort Ointment	...	...	80·00	Each suppository contains 72 grains 18 grains
Spermaceti	...	...	20·00	

Melt the pilewort ointment at a temperature not exceeding 38°, add the spermaceti, stir till dissolved, and divide into suppositories, each weighing about 6 grammes (90 grains).

These suppositories are for rectal application, being used for hæmorrhoids.

**SUPRARENALES GLANDULÆ.**

## SUPRARENAL GLANDS.

*Synonyms.*—Suprarenal Capsules ; Suprarenals.

Suprarenal glands or capsules are obtained from the sheep, *Ovis aries*, Linn. (Order Ungulata), or the ox, *Bos taurus* (Order Ungulata). They constitute a nephridium which consists of two triangular bodies, each of which rests by its lower border upon the upper border of the kidney.

The glands consist of a soft, dark, medullary portion, and a firmer, cortical portion, surrounded by a sheath of connective tissue, which should be removed, together with any fat present, before use.

The cells of the medulla contain reducing substances, including a chromogen and alecithin-like substance resembling jecorin, but the active chemical constituent of the glands is the base adrenine.

The action of suprarenal gland substance is virtually that of the active principle adrenine. Preparations of the whole gland are generally preferred for internal administration, solutions of the active principle being employed as hæmostatics. The medulla contains the adrenine, and it is closely associated with the sympathetic nervous system. The cortex probably also has an important function, which is at present unknown ; its development is quite distinct from that of the cortical part. The introduction of this substance into medicine resulted from the observation that failure of the suprarenal glands was the cause of the series of symptoms known as Addison's disease. The gland substance was therefore administered to supply the deficient internal secretion ; and though its use for this purpose has not proved completely successful, its effect when introduced into the circulation and its local action in constricting blood vessels prove its active principle to be one of the most powerful substances known in medicine (see Adrenina). Adrenine is destroyed in the stomach, when taken by the mouth, and locally when injected subcutaneously, so that the only certain way of inducing its systemic action is to inject directly into the circulation. Suprarenal glands are employed as Suprarenalum Siccum for use in dry form, as Extractum Suprarenales Liquidum for internal administration, and for the preparation of suppositories, ointment, spray solutions, etc.

**SUPRARENALUM SICCUM.**

## DRY SUPRARENAL.

*Synonym.*—Suprarenal Powder.

Dry suprarenal may be prepared from the fresh suprarenal glands of healthy sheep or oxen, by removing all fat, cleaning the tissues, drying, and powdering.

The product is a light yellowish-brown powder, with a slight but characteristic odour. Partially soluble in water. The product represents approximately six times its weight of fresh suprarenal glands, free from fat, and should not yield more than 7 per cent. of



ash on incineration. If 5 decigrams of the powder be macerated with 25 mls of distilled water for fifteen minutes, and filtered, the addition of a few drops of ferric chloride test-solution to the filtrate should produce a fugitive, emerald-green colouration.

Dry suprarenal powder may be given internally in cachets, capsules, or tablets; it is also used in the preparation of snuff (see *Pulvis Suprarenalis Compositus*), suppositories containing  $\frac{1}{2}$  to 2 decigrams (1 to 3 grains) in each, etc.

*Dose*.—1 to 5 decigrams (2 to 8 grains).

## SYRUPUS.

### SYRUP.

Refined Sugar	...	...	...	...	66.66
Distilled Water, boiling, sufficient to produce,					
by weight	...	...	...	...	100.00

Dissolve the sugar in half its weight of the water, by the aid of heat, and add more boiling water if necessary to make the product weigh 100. Specific gravity, 1.33.

*NOTE*.—Syrupus, U.S.P., is prepared by dissolving 85 of sugar in sufficient distilled water to produce 100 by volume; specific gravity, about 1.313 at 25°.

## SYRUPUS ACACIÆ.

### SYRUP OF ACACIA.

Mucilage of Acacia	...	...	...	...	25.00
Syrup, sufficient to produce	...	...	...	...	100.00

Mix the syrup with the mucilage.

This syrup is used principally as a demulcent in cough mixtures.

*NOTES*.—Syrup of acacia should be freshly prepared when required, as it does not keep well. Syrupus Acaciæ, U.S.P., is prepared by dissolving 10 of gum acacia and 80 of sugar in sufficient distilled water to produce 100 by volume.

## SYRUPUS ACIDI CITRICI.

### SYRUP OF CITRIC ACID.

Citric Acid	...	...	...	...	3.00
Tincture of Lemon	...	...	...	...	3.00
Syrup, sufficient to produce	...	...	...	...	100.00

Dissolve the citric acid in the syrup, then add the tincture of lemon.

This preparation is more stable than Syrupus Limonis, which it may replace with advantage.

*NOTE*.—Syrupus Acidi Citrici, U.S.P., is prepared by dissolving 1 of citric acid in 1 of distilled water, mixing the solution with 50 of syrup, then adding 1 of tincture of fresh lemon peel and sufficient syrup to produce 100 by volume.

**SYRUPUS ACIDI HYDRIODICI.**

SYRUP OF HYDRIODIC ACID.

Diluted Hydriodic Acid, by weight	...	...	10·00
Distilled Water	...	...	30·00
Syrup, sufficient to produce, by weight	...	...	100·00

Mix the acid with the distilled water, and add the syrup.

Syrup of hydriodic acid is given for the same purposes as the alkaline iodides.

*Dose.*—1 to 4 mls (20 to 60 minims), well diluted.

*NOTE.*—This preparation corresponds to Syrupus Acidi Hydriodici, U.S.P., and contains about 1 per cent., by weight, of absolute hydriodic acid.

**SYRUPUS ÆTHERIS COMPOSITUS.**

COMPOUND SYRUP OF ETHER.

Purified Ether, by weight	...	...	2·00
Alcohol, by weight	...	...	5·00
Distilled Water, by weight	...	...	23·00
Syrup, sufficient to produce, by weight	...	...	100·00

Dilute the syrup with the water, and add the ether dissolved in the alcohol.

This syrup is used as an antispasmodic and diffusible stimulant.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

*NOTE.*—This preparation corresponds to Syrupus cum Æthere of the French Pharmacopœia

**SYRUPUS ALTHÆÆ.**

SYRUP OF MARSHMALLOW.

Marshmallow Root, Sliced	...	...	4·00
Refined Sugar	...	...	90·00
Distilled Water	...	...	56·00

Macerate the marshmallow root in the water for twelve hours, then strain, press, and filter. The filtrate should measure 45. To this add the sugar, dissolve, and heat the syrup to boiling. Cool and strain through flannel. The finished product should measure about 100.

Syrup of marshmallow is used as a demulcent for coughs.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**SYRUPUS AMYGDALÆ.**

SYRUP OF ALMOND.

Spirit of Bitter Almond	...	...	1·00
Orange-flower Water, undiluted	...	...	10·00
Syrup, sufficient to produce	...	...	100·00

Mix the spirit with the water, and add the syrup.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS APOMORPHINÆ.**

## SYRUP OF APOMORPHINE.

Apomorphine Hydrochloride	...	...	...	0·05
Diluted Hydrochloric Acid	...	...	...	0·25
Alcohol	...	...	...	4·50
Distilled Water	...	...	...	4·50
Syrup, sufficient to produce	...	...	...	100·00

Dissolve the apomorphine hydrochloride in the alcohol, water, and acid, previously mixed; then add sufficient syrup to make up the required volume.

Syrup of apomorphine is used as an expectorant in acute and chronic bronchitis.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation contains about  $\frac{1}{36}$  grain of apomorphine hydrochloride in 1 fluid drachm.

**SYRUPUS AROMATICUS.**

## AROMATIC SYRUP.

Tincture of Orange	...	...	...	25·00
Cinnamon Water	...	...	...	25·00
Syrup	...	...	...	50·00

Add the tincture of orange to the cinnamon water, filter the mixture through powdered talc, and add the syrup.

Aromatic syrup is used as a flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS AURANTII.**

## SYRUP OF ORANGE.

Tincture of Orange	...	...	...	12·50
Syrup	...	...	...	87·50

Mix the syrup with the tincture.

Syrup of orange is used as a flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Syrupus Aurantii, U.S.P., is prepared by triturating 1 of magnesium carbonate with 5 of tincture of sweet orange peel, then adding gradually 40 of water, filtering, adding sufficient water to produce 45, dissolving in the filtrate 0·5 of citric acid, and 82 of sugar, and adding sufficient water to produce 100 by volume.

**SYRUPUS AURANTII FLORIS.**

## SYRUP OF ORANGE FLOWER.

Orange Flower Water	...	...	...	11·11
Refined Sugar	...	...	...	66·67
Distilled Water, boiling, sufficient to produce,				
by weight	...	...	...	100·00

Dissolve the sugar in one-third its weight of the water by the aid of heat, add the orange flower water, mix, and add recently



boiled distilled water, if necessary, to make the product weigh 100.

This syrup is used as a flavouring agent.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE*.—Syrupus Aurantii Floris, U.S.P., is prepared by dissolving 85 of sugar in sufficient orange flower water to produce 100 by volume.

### SYRUPUS BUTYL-CHLORAL HYDRATIS.

SYRUP OF BUTYL-CHLORAL HYDRATE.

Butyl-chloral Hydrate	...	...	...	3.50
Syrup, sufficient to produce	...	...	...	100.00

Dissolve the butyl-chloral hydrate in the syrup, previously made hot.

This syrup is used as an analgesic in neuralgia.

*Dose*.—4 to 15 mils (1 to 4 fluid drachms).

*NOTE*.—This preparation contains about 2 grains of butyl-chloral hydrate in 1 fluid drachm.

### SYRUPUS CALCII CHLORIDI.

SYRUP OF CALCIUM CHLORIDE.

*Synonyms*.—Elixir Calcii Chloridi; Elixir of Calcium Chloride.

Calcium Chloride	...	...	...	...	12.50
Citric Acid	...	...	...	...	5.00
Distilled Water	...	...	...	...	15.00
Aromatic Syrup, sufficient to produce	...	...	...	...	100.00

Dissolve the calcium chloride and citric acid in the water, and add the aromatic syrup.

The unpleasant, acrid taste of the calcium chloride is well covered in this preparation, which is especially suitable for administration to children.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

### SYRUPUS CALCII HYPOPHOSPHITIS.

SYRUP OF CALCIUM HYPOPHOSPHITE.

Calcium Hypophosphite	...	...	...	...	1.75
Hypophosphorous Acid	...	...	...	...	0.25
Refined Sugar	...	...	...	...	80.00
Distilled Water, sufficient to produce	...	...	...	...	100.00

Dissolve the calcium hypophosphite in 45 of the distilled water, filter the product, and add the refined sugar. Dissolve with the aid of a gentle heat; add the hypophosphorous acid, and a sufficient quantity of distilled water to make up the required volume.

*Dose*.—4 to 15 mils (1 to 4 fluid drachms).

*NOTE*.—Syrupus Calcii et Sodii Hypophosphitum, N.F., is prepared by dissolving 3.5 each of calcium and sodium hypophosphites, 0.15 of citric acid, and 77 of sugar, in sufficient water to produce 100 by volume.

**SYRUPUS CALCII LACTOPHOSPHATIS.**

SYRUP OF CALCIUM LACTOPHOSPHATE.

Precipitated Calcium Carbonate	...	...	2'50
Lactic Acid	...	...	6'00
Concentrated Phosphoric Acid	...	...	4'60
Refined Sugar	...	...	70'00
Orange Flower Water, undiluted	...	...	2'50
Distilled Water, sufficient to produce	...	...	100'00

Dilute the lactic acid with four times its volume of the water, gradually add the calcium carbonate, and dissolve; then add the concentrated phosphoric acid, dilute with a small quantity of distilled water, add the orange flower water, and filter. Finally, dissolve the sugar in the filtrate without heat, strain, and add sufficient water to make up the required volume.

Syrup of calcium lactophosphate is a suitable form for administering lime to growing children. It was once believed to influence nutrition in wasting diseases; its action is due to its calcium.

*Dose.*—2 to 4 mls  $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS CALCII LACTOPHOSPHATIS CUM FERRO.**

SYRUP OF CALCIUM LACTOPHOSPHATE WITH IRON.

*Synonym.*—Syrupus Ferri et Calcii Lactophosphatum.

Ferrous Lactate	...	...	...	...	0'85
Potassium Citrate	...	...	...	...	0'85
Distilled Water	...	...	...	...	6'00
Syrup of Calcium Lactophosphate, sufficient to produce	...	...	...	...	100'00

Dissolve the ferrous lactate and potassium citrate in the water by the aid of heat, and add sufficient syrup of calcium lactophosphate to make up the required volume.

It is a mild chalybeate for children's use.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS CAMPHORÆ COMPOSITUS.**

COMPOUND SYRUP OF CAMPHOR.

Camphor	...	...	...	...	0'043
Oil of Anise	...	...	...	...	0'043
Benzoic Acid	...	...	...	...	0'065
Glacial Acetic Acid	...	...	...	...	1'10
Tincture of Opium	...	...	...	...	1'72
Vinegar of Ipecacuanha	...	...	...	...	6'25
Vinegar of Squill	...	...	...	...	6'25
Refined Sugar	...	...	...	...	70'00
Burnt Sugar	...	...	...	...	0'30
Distilled Water, sufficient to produce	...	...	...	...	100'00

Dissolve the camphor, oil of anise, and benzoic acid in the tincture of opium, mix with the syrup prepared by dissolving the sugar in boiling distilled water and cooling, add the other ingredients, and make up the volume of product to 100 by the addition of distilled water.

Compound syrup of camphor is used as an expectorant and sedative cough mixture.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds to Syrupus Camphoræ Compositus of the Bristol Royal Infirmary.

## SYRUPUS CASCARÆ AROMATICUS.

### AROMATIC SYRUP OF CASCARA.

Liquid Extract of Cascara Sagrada	...	...	40.00
Tincture of Orange	...	...	10.00
Alcohol	...	...	5.00
Cinnamon Water	...	...	15.00
Syrup	...	...	30.00

Mix the liquid extract with the cinnamon water, tincture of orange, and alcohol; then add the syrup.

The disagreeable taste of cascara is well disguised in this preparation. It is a favourite remedy in habitual constipation.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

## SYRUPUS CHLORAL.

### SYRUP OF CHLORAL.

Chloral Hydrate	...	...	18.29
Distilled Water...	...	...	18.75
Syrup, sufficient to produce	...	...	100.00

Add the chloral hydrate to the water, dissolve, and mix the solution with sufficient syrup to produce the required volume.

It is a convenient method for giving chloral hydrate.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTE.*—This preparation contains 10 grains of chloral hydrate in 1 fluid drachm.

## SYRUPUS CODEINÆ.

### SYRUP OF CODEINE.

Codeine Phosphate	...	...	0.46
Distilled Water...	...	...	1.25
Syrup	...	...	98.75

Add the codeine phosphate to the distilled water, dissolve, and mix the solution with the syrup.



Syrup of codeine is used to allay cough, especially the cough of phthisis.

*Dose*.—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

NOTES.—This preparation contains  $\frac{1}{4}$  grain of codeine phosphate in 1 fluid drachm, but the quantity of water ordered is insufficient to retain the codeine phosphate in solution in cold weather, and should be increased to 2 per cent. The presence of 5 per cent. of alcohol is said to render the preparation more stable.

## SYRUPUS CROCI.

SYRUP OF SAFFRON.

Glycerin of Saffron	...	...	...	12.50
Syrup, sufficient to produce	...	...	...	100.00

Mix the glycerin of saffron with the syrup.

Syrup of saffron is used as a colouring and flavouring agent, 4 mils (1 fluid drachm) to 30 mils (1 fluid ounce) of mixture.

## SYRUPUS EUCALYPTI COMPOSITUS.

COMPOUND SYRUP OF EUCALYPTUS.

*Synonyms*.—Syrupus Eucalypti Rostratae.

Eucalyptus Gum, from <i>Eucalyptus rostrata</i>	...	...	...	7.50
Oil of Eucalyptus	...	...	...	0.25
Refined Sugar	...	...	...	60.00
Mucilage of Gum Acacia	...	...	...	2.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the eucalyptus gum in the distilled water, strain, and dissolve the sugar in the strained liquid; then mix the oil with the mucilage and add the mixture to the syrup.

This preparation is used for its astringency, internally in diarrhoea and dysentery, and locally diluted with 7 parts of water as a gargle.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## SYRUPUS EUCALYPTI GUMMI.

SYRUP OF EUCALYPTUS GUM.

*Synonyms*.—Syrupus Gummi Rubri; Syrup of Red Gum.

Liquid Extract of Eucalyptus Gum	...	...	62.50
Refined Sugar	...	...	37.50

Dissolve the sugar in the liquid extract of red gum.

This preparation resembles Syrupus Eucalypti Compositus in its properties. It is given internally as an astringent, and is used diluted with 7 parts of water as a gargle for inflamed throats.

*Dose*.—2 to 4 mils (30 to 60 minims).

**SYRUPUS FERRI BROMIDI.**

SYRUP OF FERROUS BROMIDE.

Iron Wire, free from oxide	...	...	...	2.50
Bromine...	...	...	...	6.00
Refined Sugar	...	...	...	70.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the sugar in 30 of distilled water, by heat. Place the iron wire with 20 of distilled water in a glass flask having a capacity of at least 100, and surround it with cold water. Then add the bromine in successive quantities; shake occasionally until the froth becomes white and the reaction is complete. Filter the solution into the warm syrup, and, if necessary, add sufficient distilled water to produce the required volume.

This syrup is a mild hæmatinic, suitable for use in amenorrhæa and anæmic conditions.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation contains about  $4\frac{1}{2}$  grains of ferrous bromide in 1 fluid drachm.

**SYRUPUS FERRI BROMIDI CUM QUININA.**

SYRUP OF FERROUS BROMIDE WITH QUININE.

Quinine Acid Hydrobromide	...	...	...	2.00
Diluted Hydrobromic Acid	...	...	...	2.00
Distilled Water...	...	...	...	8.00
Syrup of Ferrous Bromide, sufficient to produce	...	...	...	100.00

Dissolve the quinine acid hydrobromide in the acid and water, then add the syrup.

This preparation is a hæmatinic and bitter, for use in convalescence from acute disease.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation contains about  $1\frac{1}{10}$  grains of quinine acid hydrobromide and 4 grains of ferrous bromide in 1 fluid drachm.

**SYRUPUS FERRI BROMIDI CUM QUININA ET STRYCHNINA.**

SYRUP OF FERROUS BROMIDE WITH QUININE AND STRYCHNINE.

Strychnine, in powder	...	...	...	0.0285
Quinine Acid Hydrobromide	...	...	...	2.00
Diluted Hydrobromic Acid	...	...	...	2.00
Distilled Water...	...	...	...	8.00
Syrup of Ferrous Bromide, sufficient to produce	...	...	...	100.00

Dissolve the strychnine and the quinine acid hydrobromide in the acid and water, then add the syrup.

It is a bitter ferruginous tonic resembling the corresponding syrup of the phosphates.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—This preparation contains about  $\frac{1}{64}$  grain of strychnine,  $1\frac{1}{16}$  grains of quinine acid hydrobromide, and 4 grains of ferrous bromide in 1 fluid drachm.

## SYRUPUS FERRI HYPOPHOSPHITIS.

SYRUP OF FERRIC HYPOPHOSPHITE.

Strong Solution of Ferric Hypophosphite ...	20'00
Syrup, sufficient to produce ... ..	100'00

Mix the syrup with the solution.

It is given to children as a mild chalybeate.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

NOTE.—This preparation contains about 1 grain of ferric hypophosphite in 1 fluid drachm.

## SYRUPUS FERRI IODIDI.

SYRUP OF FERROUS IODIDE.

Iron, in wire ... ..	2'50
Iodine ... ..	8'30
Refined Sugar ... ..	82'50
Distilled Water, sufficient to produce ...	100'00

Dissolve the sugar in 30 of boiling water, by the aid of heat, and mix 2'5 of the syrup with an equal volume of water. Next, place the iodine and iron wire in a suitable flask with 12'5 of water, plug the neck with cotton wool, and allow the reaction to proceed until the liquid loses its brown colour. Heat the solution gradually to boiling-point, and allow it to boil gently until the froth is no longer yellow. While the liquid is still hot, filter into the previously prepared strong syrup, and wash the filter and flask with the diluted syrup, heated to boiling-point. Finally, pour sufficient distilled water over the filter to make the product measure 100 when cold. Specific gravity, 1'380 to 1'387. Care should be taken to avoid overheating the syrup, or discolouration from caramelisation of the sugar may result. It has been suggested that syrup of glucose should be substituted for some of the sugar, to assist in the preservation of the iron from oxidation.

This preparation has the properties both of the iron and iodine ions, and is much employed in the treatment of tuberculous and syphilitic conditions. The amount of iodide which can be given however by this preparation is very small. It is best dispensed undiluted, the dose being mixed with water at the time of taking. The syrup is very susceptible to oxidation, especially when prepared by the official process; when made from *Liquor Ferri Iodidi Fortis* it is less prone to become discoloured, owing to the presence of hypophosphorous acid. The syrup is incompatible with tap-water, alkalies



and their carbonates, alkaline salts, acids and acid salts, vegetable astringents, oxidising agents (especially potassium chlorate), and Syrupus Ferri Phosphatis cum Quinina et Strychnina. Specimens containing hypophosphorous acid differ markedly from those made by the official process in the degree of their incompatibility with these substances; the addition of a small proportion of this acid to the official syrup would be an improvement.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES.*—This syrup contains about 1 per cent. of ferrous iodide, and is best stored in small bottles that are quite filled. It may be prepared extemporaneously by diluting Liquor Ferri Iodidi Fortis with seven times its volume of syrup. Syrupus Ferri Iodidi, U.S.P., contains about 5 per cent. by weight of ferrous iodide, and is preserved by the addition of diluted hypophosphorous acid. Specific gravity, about 1.349 at 25°. Average dose, 1 mil (15 minims).

## SYRUPUS FERRI PHOSPHATIS.

### SYRUP OF FERROUS PHOSPHATE.

Iron, in wire	...	...	...	...	0.86
Concentrated Phosphoric Acid	...	...	...	...	6.25
Syrup	...	...	...	...	70.00
Distilled Water, sufficient to produce...	...	...	...	...	100.00

Mix the acid with an equal volume of water, place in a flask with the iron wire, plug the neck of the flask with cotton-wool, and heat gently until solution is effected. Filter the solution, when cold, into the syrup, and pour sufficient distilled water over the filter to make up the required volume.

This syrup has a mild iron action; the  $\text{PO}_4$  ion has no important influence. The syrup may be prepared extemporaneously by mixing 1 of Liquor Ferri Phosphatis with  $5\frac{1}{2}$  of syrup, and adding sufficient distilled water to produce 8 by volume.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES.*—This preparation contains the equivalent of 1 grain of anhydrous ferrous phosphate in 1 fluid drachm. It is best kept in small bottles, which should be quite full.

## SYRUPUS FERRI PHOSPHATIS COMPOSITUS.

### COMPOUND SYRUP OF FERROUS PHOSPHATE.

*Synonyms.*—Chemical Food; Parrish's Syrup.

Iron, in wire	...	...	...	...	0.40
Concentrated Phosphoric Acid	...	...	...	...	7.50
Precipitated Calcium Carbonate	...	...	...	...	1.35
Potassium Bicarbonate	...	...	...	...	0.01
Sodium Phosphate	...	...	...	...	0.01
Cochineal	...	...	...	...	0.35
Refined Sugar	...	...	...	...	70.00
Orange Flower Water	...	...	...	...	3.00
Distilled Water, sufficient to produce	...	...	...	...	100.00

Dissolve the iron wire by a gentle heat in a mixture of 5 of concentrated phosphoric acid and 3 of distilled water, performing the operation in a flask plugged with cotton-wool, and keeping the iron completely covered by the liquid. Cool the solution and add it to a mixture of the calcium carbonate with 2.5 of the phosphoric acid and 10 of distilled water; then add the potassium carbonate and sodium phosphate, filter, and set aside. Next, boil the cochineal with 37.5 of distilled water, filter, and pour over the filter a sufficient quantity of distilled water to produce 35 of filtrate. Dissolve the sugar in this filtrate by the aid of heat, strain, and cool; then add the iron phosphate solution, and the orange flower water, with sufficient distilled water to produce 100.

It is an excellent preparation of iron for children in general debility with anæmia, rickets, tuberculous bone diseases, etc.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

**NOTES.**—This syrup should be kept in bottles which are quite filled. It contains about  $\frac{1}{2}$  grain of iron phosphate, and  $\frac{4}{5}$  grain of calcium phosphate in 1 fluid drachm, with small quantities of potassium and sodium phosphates. The so-called triple syrup (*Syrupus Triplex*) is a mixture of equal parts of compound syrup of ferrous phosphate, syrup of phosphate of iron with quinine and strychnine, and compound syrup of hypophosphites.

### SYRUPUS FERRI PHOSPHATIS CUM QUININA ET STRYCHNINA.

SYRUP OF PHOSPHATE OF IRON WITH QUININE AND STRYCHNINE

*Synonyms.*—Easton's Syrup; Syrupus Trium Phosphatum.

Iron, in wire	...	...	...	...	0.86
Concentrated Phosphoric Acid	...	...	...	...	6.25
Strychnine, in powder	...	...	...	...	0.057
Quinine Sulphate	...	...	...	...	1.48
Syrup	...	...	...	...	70.00
Distilled Water, sufficient to produce	...	...	...	...	100.00

Mix the acid with an equal volume of water, place in a flask with the iron wire, plug the neck of the flask with cotton-wool, and heat gently until solution is effected. Mix the quinine sulphate and strychnine in a mortar with 20 of distilled water, then add the solution of phosphate of iron, dissolve, filter into the syrup, and pass sufficient water through the filter to produce the required volume. The syrup should be stored in small bottles which are quite full.

This preparation is the modern representative of Easton's syrup, which was originally prepared by dissolving freshly precipitated phosphate of iron, with quinine and strychnine, in diluted phosphoric acid, and dissolving sugar in the solution. It may be prepared extemporaneously by mixing  $1\frac{1}{2}$  of *Liquor Quininae et Strychninae* with 1 of *Liquor Ferri Phosphatis*, and adding sufficient syrup to produce 8 by volume. The syrup is employed as a tonic in convalescence from acute disease, in general debility with anæmia

and in neurasthenic conditions. The main action is due to strychnine. It is best prescribed undiluted, the dose being mixed with water at the time of taking. It is incompatible with Syrupus Ferri Iodidi.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTES.—This preparation contains about  $\frac{1}{32}$  grain of strychnine,  $\frac{1}{8}$  grain of quinine sulphate, and the equivalent of 1 grain of anhydrous ferrous phosphate, in 1 fluid drachm. It has been suggested that the quantity of phosphoric acid should be increased to 7.25 per cent. during warm weather. The original Easton's syrup was prepared by dissolving 300 grains of ferrous sulphate in 1 ounce of boiling water, adding a solution of 360 grains of sodium phosphate in 2 ounces of boiling water, and dissolving the well-washed precipitate of phosphate of iron, together with 6 grains of strychnine and the alkaloid precipitated by ammonia from a sulphuric acid solution of 192 grains of quinine sulphate, in 14 fluid ounces of diluted phosphoric acid, 14 ounces of sugar being subsequently dissolved in the solution without heat, so as to produce 24 fluid ounces of syrup. Syrupus Ferri Quininae et Strychninae Phosphatum, U.S.P., is prepared by mixing glycerite of the phosphates of iron, quinine, and strychnine with three times its volume of syrup.

## SYRUPUS FERRI SUBCHLORIDI.

### SYRUP OF FERROUS CHLORIDE.

Iron Wire	...	...	...	...	3.50
Hydrochloric Acid	...	...	...	...	10.00
Citric Acid	...	...	...	...	0.10
Distilled Water	...	...	...	...	6.25
Syrup, sufficient to produce	...	...	...	...	100.00

Mix the hydrochloric acid with 5 of the water in a flask, add the iron wire, and apply heat gently until action ceases. Remove the flask from the source of heat, add the citric acid, and filter the solution through paper into 50 of the syrup; then pass the remainder of the water through the filter into the mixture, and add sufficient syrup to make up the required volume.

This syrup was formerly official, but is now seldom used.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## SYRUPUS FICORUM.

### SYRUP OF FIGS.

Figs, cut small	...	...	...	...	40.00
Refined Sugar	...	...	...	...	50.00
Distilled Water, sufficient to produce	...	...	...	...	100.00

Add the figs to boiling distilled water, 100, and allow to digest at a gentle heat for one hour; then strain and express, evaporate the liquid to one-half, dissolve the sugar in the concentrated liquid, and add sufficient distilled water to produce the required volume of syrup.

Syrup of figs is a mild laxative, suitable for administration to young children.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).



**SYRUPUS FICORUM COMPOSITUM.**

COMPOUND SYRUP OF FIGS.

*Synonym.*—Elixir Ficorum; Elixir of Figs.

Compound Tincture of Rhubarb	...	...	5'00
Liquid Extract of Senna Pods	...	...	10'00
Spirit of Cinnamon	...	...	1'25
Spirit of Nutmeg	...	...	1'25
Tasteless Liquid Extract of Cascara Sagrada	...	...	5'00
Syrup of Figs, sufficient to produce	...	...	100'00

Mix the tincture and spirits with the liquid extracts, and add the syrup.

Compound syrup of figs is an excellent laxative for children and delicate persons.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

**SYRUPUS GLUCOSI.**

SYRUP OF GLUCOSE.

Liquid Glucose...	...	...	33'00
Syrup	...	...	66'00

Stir together, warming gently until mixed.

It is used as a pill excipient, but a mixture of equal parts of liquid glucose and syrup answers the purpose better.

**SYRUPUS GLYCEROPHOSPHATUM COMPOSITUS.**

COMPOUND SYRUP OF GLYCEROPHOSPHATES.

*Synonym.*—Compound Elixir of Glycerophosphates.

Calcium Glycerophosphate	...	...	2'00
Potassium Glycerophosphate	...	...	1'00
Sodium Glycerophosphate	...	...	1'00
Magnesium Glycerophosphate	...	...	1'00
Iron Glycerophosphate, in fine powder	...	...	0'50
Glacial Acetic Acid	...	...	1'00
Caffeine	...	...	0'50
Strychnine Hydrochloride	...	...	0'024
Refined Sugar	...	...	70'00
Cudbear	...	...	1'25
Chloroform	...	...	0'25
Alcohol	...	...	0'50
Distilled Water, sufficient to produce	...	...	100'00

Boil the cudbear for ten minutes with 50 of distilled water, and dissolve the strychnine hydrochloride in the warm filtrate, then add the glycerophosphates, ~~citric acid~~, and caffeine ~~citrate~~, dissolve, add the sugar, heat until dissolved, and strain; when cold add the previously mixed chloroform and alcohol, and sufficient distilled water to make up the required volume.

This syrup is used as a tonic in general debility, convalescence, and in neurasthenic conditions. The strychnine is the active

constituent. The glycerophosphate syrup of Dr. Robin contains pepsin, with the tinctures of ignatia and kola in place of strychnine and caffeine; it is inferior to the above preparation. For the effect of glycerophosphates, see under Acidum Glycerophosphoricum.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

*NOTES*.—This preparation contains about  $\frac{1}{75}$  grain of strychnine hydrochloride in 1 fluid drachm. Dr. Robin's original formula for this syrup specified 6 of calcium glycerophosphate, 2 each of potassium, sodium, and magnesium glycerophosphates, 1 of iron glycerophosphate, 2 by weight of tincture of ignatia, 3 of pepsin, 1 of diastase, 10 by weight of tincture of kola, and sufficient syrup of cherries to produce 100 by weight. Pulvis Glycerophosphatum Compositus may be prepared by mixing 45 of calcium glycerophosphate, 15 of magnesium glycerophosphate,  $7\frac{1}{2}$  of iron glycerophosphate, 5 of powdered nuxvomica, 20 of pepsin, and sufficient starch powder to produce 100. Dose, 3 to 6 decigrams (5 to 10 grains).

## SYRUPUS GLYCEROPHOSPHATIS <sup>um</sup> CUM FORMATIBUS.

SYRUP OF GLYCEROPHOSPHATES WITH FORMATES.

*Synonym*.—Compound Elixir of Glycerophosphates with Formates.

Calcium Glycerophosphate	...	...	...	1'50
Potassium Glycerophosphate	...	...	...	0'75
Sodium Glycerophosphate	...	...	...	0'75
Magnesium Glycerophosphate	...	...	...	0'75
Iron Glycerophosphate, in fine powder	...	...	...	0'50
Potassium Formate	...	...	...	5'00
Sodium Formate	...	...	...	5'00
Strychnine Hydrochloride	...	...	...	0'024
Glacial Acetic Acid	...	...	...	1'00
Syrup	...	...	...	70'00
Distilled Water, sufficient to produce...	...	...	...	100'00

Dilute the glacial acetic acid with 20 of the distilled water, and dissolve the strychnine hydrochloride in the mixture; then add the previously mixed glycerophosphates and formates, dissolve, filter the solution, add the syrup, and make up the required volume with distilled water.

For the action of glycerophosphates, see the monograph on Acidum Glycerophosphoricum.

*Dose*.—4 to 8 mils (1 to 2 fluid drachms).

*NOTE*.—This preparation contains about  $\frac{1}{75}$  grain of strychnine hydrochloride in 1 fluid drachm.

## SYRUPUS HEMIDESMI.

SYRUP OF HEMIDESMUS.

Hemidesmus Root, bruised	...	...	...	10'00
Refined Sugar	...	...	...	70'00
Distilled Water, boiling	...	...	...	50'00

Pour the boiling distilled water upon the bruised hemidesmus root, allow to infuse for four hours, strain, and set the strained liquid aside until clear then decant, and dissolve the sugar in the

clear liquid by the aid of gentle heat. The finished product should weigh 105.

Syrup of hemidesmus is used principally as a flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## SYRUPUS HYPOPHOSPHITUM.

### SYRUP OF HYPOPHOSPHITES.

Calcium Hypophosphite	...	...	...	4.50
Potassium Hypophosphite	...	...	...	1.50
Sodium Hypophosphite	...	...	...	1.50
Diluted Hypophosphorous Acid	...	...	...	0.20
Tincture of Lemon	...	...	...	0.50
Refined Sugar	...	...	...	65.00
Distilled Water, sufficient to produce	...	...	...	100.00

Dissolve the salts in 50 of water, and dissolve the sugar in the solution without the aid of heat; then add the tincture of lemon, and finally sufficient water to make up the required volume.

This syrup is given in place of Syrupus Hypophosphitum Compositus when the use of strychnine is undesirable. There is no evidence that the hypophosphites are of any value in medicine.

*Dose.*—4 to 8 mils (1 to 2 drachms).

*NOTE.*—This preparation corresponds to Syrupus Hypophosphitum, U.S.P.

## SYRUPUS HYPOPHOSPHITUM COMPOSITUS.

### COMPOUND SYRUP OF HYPOPHOSPHITES.

Calcium Hypophosphite	...	...	...	1.00
Manganese Hypophosphite	...	...	...	0.50
Potassium Hypophosphite	...	...	...	0.50
Quinine Hypophosphite	...	...	...	0.25
Strychnine	...	...	...	0.012
Refined Sugar	...	...	...	70.00
Hypophosphorous Acid	...	...	...	0.625
Strong Solution of Iron Hypophosphite	...	...	...	5.00
Chloroform Water, sufficient to produce	...	...	...	100.00

Dissolve the calcium, manganese, potassium, and quinine hypophosphites in 40 of chloroform water, add the strychnine previously dissolved in the hypophosphorous acid, mix, and add the strong solution of ferric hypophosphite, then add the sugar, dissolve without the aid of heat, make up to 100 with chloroform water, and strain through flannel. The product is a pale, bright yellow liquid, with a very slight acid reaction.

This syrup is used as a general tonic in the debility of phthisis, convalescence from acute disease, and neurasthenic conditions. It acts by virtue of its strychnine.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).



NOTES.—This preparation contains about  $\frac{1}{15}$  grain of strychnine and  $\frac{1}{8}$  grain of quinine hypophosphite in 1 fluid drachm. Syrupus Hypophosphitum Compositus, U.S.P., is prepared with 3.5 of calcium hypophosphite, 1.75 each of potassium and sodium hypophosphites, 0.225 each of ferric and manganese hypophosphites, 0.11 of quinine, 0.0115 of strychnine, 0.375 of sodium citrate, 1.5 of diluted hypophosphorous acid, 77.5 of sugar, and sufficient water to produce 100 by volume. Pulvis Hypophosphitum Compositus may be prepared by mixing  $\frac{1}{8}$  of strychnine, 24 of calcium hypophosphite, 12 each of manganese, sodium, and iron hypophosphites, 6 of quinine hypophosphite, and sufficient milk sugar to produce 100. Two grains of this compound powder of hypophosphites will be approximately equal to 1 fluid drachm of Syrupus Hypophosphitum Compositus. Dose, 6 to 25 centigrams (1 to 4 grains).

### SYRUPUS IPECACUANHÆ.

#### SYRUP OF IPECACUANHA.

Vinegar of Ipecacuanha...	...	...	...	40.00
Refined Sugar	...	...	...	72.00

Dissolve the sugar in the vinegar of ipecacuanha by the aid of gentle heat. Specific gravity, 1.33.

Syrup of ipecacuanha is used as an expectorant for children in croup, whooping-cough, etc.

*Dose.*—1 to 8 mils (15 to 120 minims).

NOTE.—Syrupus Ipecacuanhæ, U.S.P., is prepared with 7 of fluidextract of ipecac, 1 of acetic acid (36 per cent.), 10 of glycerin, 70 of sugar, and sufficient water to produce 100 by volume.

### SYRUPUS KRAMERIÆ.

#### SYRUP OF KRAMERIA.

Liquid Extract of Krameria	...	...	...	45.00
Syrup, sufficient to produce	...	...	...	100.00

Mix the liquid extract of krameria with the syrup.

Syrup of krameria is taken as an astringent, and used, diluted with seven times its volume of water, as a gargle for inflamed throats.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—This preparation corresponds to Syrupus Krameriaë, U.S.P.

### SYRUPUS LACTUCARII.

#### Syrup of Lactucarium.

Tincture of Lactucarium	...	...	...	10.00
Glycerin	...	...	...	20.00
Citric Acid	...	...	...	0.10
Orange-flower Water, undiluted	...	...	...	5.00
Syrup, sufficient to produce	...	...	...	100.00

Mix the tincture of lactucarium with the glycerin, add the orange-flower water, in which the citric acid has previously been dissolved, filter if necessary, add the syrup, and mix thoroughly.

Syrup of lactucarium is mildly sedative, and is used in irritable cough.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

### SYRUPUS LIMONIS.

#### SYRUP OF LEMON.

Fresh Lemon Peel	...	...	...	...	2'00
Alcohol, a sufficient quantity.					
Lemon Juice, clarified	...	...	...	...	50'00
Refined Sugar	...	...	...	...	76'00

Make a tincture of the lemon peel by macerating the sliced or grated peel in 3 of the alcohol for seven days, then pressing, filtering, and making the volume up to 4 by the addition of more alcohol. Dissolve the sugar in the lemon juice by the aid of gentle heat, cool and add the previously prepared tincture. The finished product should weigh 130.

Syrup of lemon is used as a flavouring agent in acid mixtures. It is a less stable preparation than Syrupus Acidi Citrici.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### SYRUPUS MANNÆ.

#### SYRUP OF MANNA.

Manna	...	...	...	...	...	10'00
Sugar	...	...	...	...	...	55'00
Alcohol	...	...	...	...	...	2'50
Distilled Water, sufficient to produce, by weight...	...	...	...	...	...	100'00

Dissolve the manna in a mixture of the alcohol and 33 of the water; filter, add the sugar, dissolve with the aid of moderate heat, and make up to the required weight with water.

*Dose.*—4 to 16 mls (1 to 4 fluid drachms).

*NOTE.*—This preparation corresponds to Syrupus Mannæ of the German Pharmacopœia.

### SYRUPUS MANNÆ COMPOSITUS.

#### COMPOUND SYRUP OF MANNA.

Manna	...	...	...	...	...	10'00
Senna Leaves, cut small	...	...	...	...	...	10'00
Fennel, bruised	...	...	...	...	...	1'00
Sugar	...	...	...	...	...	55'00
Alcohol	...	...	...	...	...	6'00
Distilled Water, sufficient to produce, by weight...	...	...	...	...	...	100'00

Macerate the senna leaves and fennel in 60 of the water for twenty-four hours, press, filter, and evaporate to 30, then add the alcohol; allow to stand for six hours, filter and dissolve in the filtrate the manna

and sugar, finally making up to the required weight with water if necessary.

*Dose.*—4 to 16 mils (1 to 4 fluid drachms).

### SYRUPUS MARRUBII.

#### SYRUP OF HOREHOUND.

Horehound Herb, dried...	...	...	...	42'50
Refined Sugar	...	...	...	85'00
Distilled Water, boiling, a sufficient quantity.				

Digest the horehound herb with sufficient boiling water to cover it for one hour, on a water-bath; then strain, press, evaporate on the water-bath to 47, cool, and filter when quite cold. In the bright filtrate dissolve the sugar with gentle heat, adding enough water to bring the final product to specific gravity 1·330 when cold. The product should measure about 100.

Syrup of horehound is a domestic remedy for coughs.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### SYRUPUS MORI.

#### SYRUP OF MULBERRIES.

Mulberry Juice	...	...	...	50'00
Alcohol	...	...	...	6'00
Refined Sugar	...	...	...	90'00

Heat the mulberry juice to boiling point, cool, and filter; then dissolve the sugar in the filtered liquid by the aid of heat, cool, and add the alcohol. The finished product should measure about 100.

Syrup of mulberries is used as a flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### SYRUPUS PAPAVERIS.

#### SYRUP OF POPPY.

Liquid Extract of Poppy	...	...	...	40'00
Refined Sugar	...	...	...	70'00
Distilled Water, a sufficient quantity.				

Dissolve the sugar in the liquid and, if necessary, add sufficient distilled water to make 100.

Syrup of poppy is a mildly sedative preparation, used in cough mixtures.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### SYRUPUS PICIS LIQUIDÆ.

#### SYRUP OF TAR.

Tar	...	...	...	...	0'50
Alcohol	...	...	...	...	5'25
Magnesium Carbonate	...	...	...	...	1'00
Sugar	...	...	...	...	85'00
Distilled Water, sufficient to produce	...	...	...	...	100'00



Mix the tar intimately, in a mortar, with 1 of clean, white sand, add 10 of distilled water, knead the mass thoroughly with the pestle, then pour off the water, and dissolve the residue in the alcohol; triturate the magnesium carbonate and 5 of the sugar with the solution, add 40 of distilled water, stir occasionally during two hours, filter, dissolve the remaining sugar in the filtrate by the aid of gentle heat, strain, and add sufficient distilled water to produce 100.

Syrup of tar is mildly antiseptic, and is used as a disinfectant expectorant in chronic cough, phthisis, and bronchitis.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

*NOTES.*—This preparation corresponds to Syrupus Picis Liquidæ, U.S.P. Syrupus Picis cum Codeina may be prepared by dissolving 0.1 of codeine in 5 of alcohol (60 per cent.) and adding sufficient syrup of tar to produce 100 by volume. *Dose*, 2 to 4 mils ( $\frac{1}{2}$  to 2 fluid drachms).

### SYRUPUS PINI.

#### SYRUP OF PINE.

Oil of Pine	...	...	...	...	5.00
Alcohol	...	...	...	...	25.00
Tincture of Saffron	...	...	...	...	3.125
Glycerin	...	...	...	...	25.00
Light Magnesium Carbonate	...	...	...	...	15.00
Syrup, sufficient to produce	...	...	...	...	100.00

Triturate the oil of pine with the magnesium carbonate, and add gradually the alcohol, tincture of saffron, and glycerin, previously mixed; then add the syrup in several portions, stir well, and filter.

Syrup of pine is used as a mild pulmonary antiseptic and expectorant in chronic cough.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### SYRUPUS PRUNI VIRGINIANÆ.

#### SYRUP OF WILD CHERRY.

*Synonym.*—Syrup of Virginian Prune.

Wild Cherry Bark, in No. 20 powder	...	15.00
Refined Sugar, in coarse powder	...	75.00
Glycerin	...	6.25
Distilled Water, sufficient to produce	...	100.00

Add sufficient distilled water to the powdered bark to moisten it thoroughly, macerate for twenty-four hours, then transfer to a percolator, and allow to percolate slowly until the product measures 45. Dissolve the sugar in the percolate without the aid of heat, add the glycerin, mix, strain, and pass sufficient distilled water through the strainer to make up the required volume.

Syrup of wild cherry is a sedative for use in the cough of phthisis and in chronic bronchitis.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds generally to Syrupus Pruni Virginianæ, U.S.P., but the latter contains 15 of glycerin, and only 70 of sugar in 100 by volume.

**SYRUPUS QUININÆ HYDRIODIDI.**

SYRUP OF QUININE HYDRIODIDE.

*Synonym.*—Syrup of Iodide of Quinine.

Quinine Hydriodide	...	...	...	...	2'00
Distilled Water	...	...	...	...	2'00
Syrup of Citric Acid, sufficient to produce	...	...	...	...	100'00

Dissolve the quinine hydriodide in the distilled water, and add sufficient of the syrup to produce the required volume.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation contains about  $1\frac{1}{10}$  grains of quinine hydriodide in 1 fluid drachm.

**SYRUPUS QUININÆ HYDROBROMIDI.**

SYRUP OF QUININE HYDROBROMIDE.

Quinine Acid Hydrobromide	...	...	...	2'00
Syrup of Orange, sufficient to produce	...	...	...	100'00

Dissolve the quinine acid hydrobromide in the syrup of orange.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms) in water.

*NOTE.*—This preparation contains about  $1\frac{1}{10}$  grains of quinine acid hydrobromide in 1 fluid drachm.

**SYRUPUS RHAMNI.**

SYRUP OF BUCKTHORN.

Buckthorn Juice, freshly expressed	...	...	50'00
Strong Tincture of Ginger	...	...	0'50
Oil of Pimento	...	...	0'0025
Alcohol	...	...	3'00
Refined Sugar	...	...	64'00
Distilled Water, sufficient to produce, by weight	...	...	100'00

Evaporate the buckthorn juice to 30, and set aside for twelve hours; then filter, dissolve the sugar in the filtrate by the aid of heat, strain, and cool. Mix the tincture and oil with the alcohol, mix the solution with the syrup, and add sufficient distilled water to make the product weigh 100.

Syrup of buckthorn is used as a purgative, and has been given to children, but it may cause griping.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Syrupus Rhamni, B.P., 1867, was prepared by evaporating 320 of freshly expressed buckthorn juice to 200, digesting it at a gentle heat with 3 each of sliced ginger and bruised pimento for four hours, straining, cooling, adding 24 of rectified spirit, allowing the mixture to stand for two days, and dissolving 320 of sugar in the clear liquor, or sufficient to produce a syrup of specific gravity 1.32.

**SYRUPUS RHEI.**

## SYRUP OF RHUBARB.

Rhubarb Root, in No. 20 powder	...	...	5'00
Coriander Fruit, in No. 20 powder	...	...	5'00
Refined Sugar	...	...	60'00
Alcohol	...	...	20'00
Distilled Water	...	...	60'00

Mix the powdered rhubarb root and coriander fruit, moisten the mixture with part of the alcohol and water previously mixed, pack in a percolator after standing awhile, and percolate slowly with the remainder of the diluted alcohol; concentrate the percolate by evaporation until the volume is reduced to 35, filter, and dissolve the sugar in the filtrate by the aid of heat. The weight of the finished product should be about 100.

Syrup of rhubarb is used as a purgative for children.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTE.*—Syrupus Rhei, U.S.P., is prepared by mixing 0.4 of spirit of cinnamon with 10 of fluidextract of rhubarb, adding 1 of potassium carbonate, previously dissolved in 5 of water, and making up the volume of product to 100 with syrup. Syrupus Rhei Aromaticus, U.S.P., is prepared by dissolving 0.1 of potassium carbonate in 15 of aromatic tincture of rhubarb, filtering if necessary, and adding sufficient syrup to make the product measure 100.

**SYRUPUS RHŒADOS.**

## SYRUP OF RED POPPY.

Red Poppy Petals	...	...	22'75
Refined Sugar	...	...	63'00
Alcohol	...	...	4'375
Distilled Water, sufficient to produce	...	100'00	

Heat 40 of the distilled water upon a water-bath; add the red poppy petals gradually, with constant stirring, then remove the vessel from the source of heat, allow the drug to infuse for twelve hours, press out the liquid, and strain. Add the sugar to the strained liquid, dissolve by the aid of heat, cool, add the alcohol, and make up the weight of product to 100 by the addition of distilled water.

Syrup of red poppy is mildly astringent, but is used principally as a colouring agent for mixtures and gargles.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS ROSÆ.**

## SYRUP OF ROSES.

Dried Red Rose Petals	...	...	4'00
Refined Sugar	...	...	60'00
Distilled Water, boiling	...	...	40'00

Add the petals to the water, and allow them to infuse for two hours; then strain, press the residue, heat the strained infusion to



boiling-point, filter, add the sugar to the filtrate, and dissolve by the aid of heat. The resulting syrup should weigh 92.

Syrup of roses is used as a colouring agent for mixtures and gargles.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE*.—Syrupus Rosæ, U.S.P., is prepared by mixing 12½ of liquid extract of rose and 1 of diluted sulphuric acid (10 per cent.) with 30 of water, allowing the mixture to stand for two hours, filtering, dissolving 75 of sugar in the liquid, and adding sufficient water to make the product measure 100.

## SYRUPUS SCILLÆ.

### SYRUP OF SQUILL.

Vinegar of Squill	...	...	...	...	34.50
Refined Sugar	...	...	...	...	65.50

Add the sugar to the vinegar of squill, and dissolve by the aid of gentle heat. The resulting syrup should weigh 100.

Syrup of squill is used as an expectorant in acid cough mixtures; after absorption it exerts a digitalis-like action on the heart.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES*.—A preparation which corresponds closely to the official Syrupus Scillæ is obtained by mixing 6 of liquid extract of squill with 2 of glacial acetic acid and 92 of syrup. Syrupus Scillæ, U.S.P., is prepared by dissolving 80 of sugar in 45 of vinegar of squill, and adding sufficient water to make the product measure 100.

## SYRUPUS SENEGÆ.

### SYRUP OF SENEGA.

Liquid Extract of Senega	...	...	...	20.00
Syrup, sufficient to produce	...	...	...	100.00

Mix the syrup with the liquid extract of senega.

Syrup of senega is a gastric expectorant for use in chronic bronchitis.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE*.—This preparation corresponds to Syrup Senegæ, U.S.P.

## SYRUPUS SENNÆ.

### SYRUP OF SENNA.

Senna	...	...	...	...	40.00
Oil of Coriander	...	...	...	...	0.02
Alcohol	...	...	...	...	0.08
Refined Sugar, in powder	...	...	...	...	50.00
Distilled Water, a sufficient quantity.	...	...	...	...	
Alcohol (20 per cent.)	...	...	...	...	70.00

Macerate the senna with 40 of the diluted alcohol for three days, then subject it to strong pressure, and reserve the expressed liquid; break up the solid residue, macerate it with 15 of the diluted

alcohol for twenty-four hours, again express, and add the expressed liquid to that previously reserved. Again break up the marc, macerate it with the remainder of the diluted alcohol for three hours, express, and evaporate the expressed liquid until it is of such a volume that when added to the liquid previously reserved and mixed the whole shall measure 40. Heat the mixture in a covered vessel to 82° for a few minutes; allow to stand for twenty-four hours, filter, pass sufficient distilled water through the filter to make the filtrate measure 40, add the sugar, dissolve by the aid of gentle heat, cool, add the oil of coriander, previously dissolved in the strong alcohol, and shake well. The product should weigh 92.

Syrup of senna is an efficient purgative for the use of children and delicate persons.

*Dose.*—2 to 8 mls ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTE.*—Syrupus Sennæ, U.S.P., is prepared by mixing 0.5 of oil of coriander with 25 of fluidextract of senna, and adding sufficient syrup to make the product measure 100.

## SYRUPUS SODII HYPOPHOSPHITIS.

SYRUP OF SODIUM HYPOPHOSPHITE.

Sodium Hypophosphite	...	...	...	2.00
Distilled Water...	...	...	...	2.00
Syrup, sufficient to produce	...	...	...	100.00

Dissolve the sodium hypophosphite in the distilled water, and add the syrup to the filtered solution.

*Dose.*—4 to 16 mls (1 to 4 fluid drachms).

## SYRUPUS TOLUTANUS.

SYRUP OF TOLU.

*Synonym.*—Syrup of Balsam of Tolu.

Balsam of Tolu	...	...	...	...	2.50
Refined Sugar	...	...	...	...	64.00
Distilled Water, a sufficient quantity.					

Add the balsam of tolu to 40 of the distilled water, cover the containing vessel lightly, and boil for thirty minutes, with frequent stirring; cool, add distilled water, if necessary, to make the liquid measure 32, filter, add the sugar, and dissolve by the heat of a water-bath. The resulting syrup should weigh 96.

Syrup of tolu is used in cough mixtures as a flavouring agent and as a mild expectorant.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES.*—A more aromatic syrup of tolu can be prepared by mixing Liquor Tolutanus with seven times its volume of syrup. Syrupus Tolutanus, U.S.P., is prepared by triturating 5 of tincture of tolu with 1 of magnesium carbonate and 6 of sugar, then gradually adding 45 of water, filtering, dissolving 76 of sugar in the liquid by the aid of gentle heat, straining while hot, and adding sufficient water to make the product measure 100.

**SYRUPUS TUSSILAGINIS FARFARÆ.**

## SYRUP OF COLTSFOOT.

Coltsfoot Flowers, dried	...	...	...	34'00
Refined Sugar, a sufficient quantity.				
Distilled Water, boiling	...	...	...	50'00

Pour the water on the flowers, and infuse in a covered vessel for six hours; then strain, press, allow to deposit, and filter. Add to the filtrate twice its weight of sugar, dissolve by the aid of heat; then boil, cool, and add sufficient distilled water to make the product weigh 100.

Syrup of coltsfoot is a domestic remedy for coughs.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS URGINEÆ.**

## SYRUP OF URGINEA.

Vinegar of Urginea	...	...	...	34'50
Refined Sugar	...	...	...	65'50

Add the sugar to the vinegar of urguea and dissolve by the aid of gentle heat. The resulting syrup should weigh 100.

Syrup of urguea is official in India and the Eastern Colonies for use in place of syrup of squill.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS VIOLÆ.**

## SYRUP OF VIOLET.

Violet Petals, fresh and clean	...	...	...	23'00
Distilled Water, boiling	...	...	...	46'00
Refined Sugar, in powder	...	...	...	87'00

Pass the petals through a sieve to separate the portions of calyx, add the water, and infuse for twelve hours. Press through linen, collect 48 of liquid, allow to stand till clear, decant, and dissolve the sugar in the liquid. The product should measure about 100.

Syrup of violet is used as a colouring agent in neutral or acid mixtures; it is also mixed with an equal volume of almond oil to form a demulcent mixture for children.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**SYRUPUS ZINGIBERIS.**

## SYRUP OF GINGER.

Ginger, in fine powder	...	...	...	2'50
Alcohol, a sufficient quantity.				
Syrup, sufficient to produce	...	...	...	100'00

Percolate the ginger with sufficient alcohol to make 5 of strong tincture; then add sufficient syrup to make up the required volume.

Syrup of ginger is used as a carminative and flavouring agent.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).



NOTES.—This syrup can be prepared more readily by mixing 5 of stronger tincture of ginger with sufficient syrup to produce 100. Syrupus Zingiberis, U.S.P., is prepared by mixing 3 of fluidextract of ginger with 2 of alcohol (95 per cent.), triturating the mixture with 1 of magnesium carbonate and 6 of sugar, then gradually adding 45 of water, filtering, dissolving 76 of sugar in the filtrate by the aid of gentle heat, straining while hot, and adding sufficient water to make the product measure 100.

## TABACI FOLIA.

### TOBACCO LEAVES.

Tobacco leaves are obtained from *Nicotiana Tabacum*, Linn. (N.O. Solanaceæ), cured and dried. The plant is a large herb indigenous to America and cultivated, together with other species of *Tabacum*, in temperate and subtropical countries. The leaves are allowed to wilt, and are then heaped and covered with mats. On these the moisture given off by the leaves condenses. When this "sweating" process is ended the leaves are tied into bundles and packed in great heaps. The temperature of the heaps rapidly rises, and is kept as near as possible to 50° by turning them. During this process bacteria are active in producing certain, at present not well understood, changes. The leaves are finally dried and are then ready for the market.

They are ovate, ovate-lanceolate, or oval-oblong, brown, and sometimes exceed 50 centimetres in length. The margin is entire, apex acute, surface glandular, hairy, and texture brittle. The leaves have a characteristic odour and nauseous, bitter, and acrid taste.

The principal constituent of tobacco leaves is the alkaloid nicotine, of which they contain from 1 to 7, sometimes even 10 per cent. They also contain a crystalline substance, nicotianin, and small quantities of alkaloids other than nicotine, viz., nicotine, nicotene, and nicoteline, together with traces of a volatile oil, etc. When tobacco is smoked the nicotine and other substances are more or less completely decomposed into pyridine, furfural, collidine, hydrocyanic acid, carbon monoxide, and other bodies, to which the poisonous effects of tobacco smoke are mainly due.

Tobacco leaves are rarely used in medicine except by smoking. The amount of nicotine present in tobacco smoke depends upon the kind of tobacco used, and the manner and apparatus in which it is smoked; some experiments with cigarette smoke showed that it contained 50 per cent. of the nicotine originally in the tobacco. Nicotine closely resembles coniine and lobeline in its pharmacological action, but the pyridine bodies present in tobacco smoke modify its action considerably. Many explanations on the soothing effect of smoking upon the nervous system have been put forward, but agreement is general only in the statement that it is not entirely due to the action of nicotine. Over-indulgence in smoking gives rise to hoarseness and cough, due to congestion of the throat and air-passages. In more severe cases there is a feeble and intermittent action of the heart, depression of

the central nervous system, impaired memory, dimness of vision, and loss of colour perception. The effect of cigar smoking on those who are not accustomed to it is to constrict blood vessels, increase intestinal movements, and raise blood pressure; these effects continue for about twenty minutes, during which time the blood pressure may be raised from 10 to 40 millimetres of mercury. Collapse then ensues, respiration becomes very feeble, the patient breaks out into a cold sweat, and blood pressure falls from 70 to 100 millimetres of mercury. These effects are probably due to the stimulant action of the nicotine on nerve-cells, followed later by the paralytic effect. Those accustomed to tobacco smoking experience none of these symptoms, because their tissues have learnt to oxidise a certain amount of nicotine. Tobacco, mixed with stramonium, lobelia, etc., is smoked for the relief of asthma. Liquid preparations of tobacco and crude solutions of nicotine are used as insecticides in horticulture by spraying and by vaporisation. In cases of poisoning by preparations of tobacco, the treatment recommended in the case of nicotine should be resorted to.

## TABELLÆ.

### CHOCOLATE TABLETS.

Chocolate tablets are prepared by mixing the required medicament with a sufficient quantity of theobroma paste or chocolate, and dividing the mass into small discs weighing about 30 centigrams (5 grains) each. In the following formulæ the quantities are given for 100 tablets:— *except in the case of cocaine, erythrol, & menthol where the quantities are given for single tablets.*

#### Tabellæ Apomorphinæ. APOMORPHINE TABLETS.

Apomorphine Hydrochloride ... 6 or 12 centigrams  
(1 or 2 grains)

#### Tabellæ Caffeinæ. CAFFEINE TABLETS.

Caffeine Citrate ... 65 decigrams (100 grains)

#### Tabellæ Cocainæ. COCAINE TABLETS.

Cocaine Hydrochloride ... 3, 5, 6, or 8 milligrams  
( $\frac{1}{20}$ ,  $\frac{1}{12}$ ,  $\frac{1}{10}$ , or  $\frac{1}{8}$  grain)

#### Tabellæ Erythrolis. ERYTHROL TABLETS.

Erythrol Tetranitrate ... 8, 16, 32, or 64 milligrams  
( $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , or 1 grain)

#### Tabellæ Mentholis. MENTHOL TABLETS.

Menthol ... 13 milligrams ( $\frac{1}{6}$  grain)

#### Tabellæ Trinitrini. TRINITRIN OR NITROGLYCERIN TABLETS.

Nitroglycerin... 65 milligrams (1 grain)

Trinitrin tablets containing 0.6 milligram ( $\frac{1}{100}$  grain) in each are official, but both stronger and weaker tablets are sometimes required.

## TABLETTÆ.

## COMPRESSED TABLETS.

Compressed tablets consist of substances reduced to very fine powder, and compressed after being rendered coherent, if necessary, by the addition of suitable liquids, such as theobroma emulsion or ethereal solution of theobroma, diluted with alcohol. The powder should be made coherent, without making it so damp as to adhere to the meshes of a No. 20 sieve when shaken or gently rubbed through. The granules thus formed are exposed to the air for a few hours, and when thoroughly dry again passed through a No. 20 sieve, but any fine powder present need not be sifted from the granules; they are then ready for compression. In compressing such substances as phenacetin and sulphonal, which from their bulk do not allow the addition of more than a trace of sugar, it is not uncommon to find the tablets cracked or their surface damaged by adhesion to the punches. These defects may be remedied by the addition of a small amount of glucose (5 to 10 per cent.); a little gum acacia is also useful. When the tablets are to be crushed to a powder before administration the addition of a small quantity of starch powder to the material before granulation is desirable, as it ensures a smooth powder free from grittiness. With reference to the drying of granules, spontaneous drying is preferable, while if heat be applied a temperature of  $45^{\circ}$  should not be exceeded. Granulation is necessary, as a rule, to secure an easy and uniform flow from the hopper to the die; it also contributes to the production of sound tablets by the interlocking of the granules, which takes place on compression. Such substances, however, as potassium chlorate and potassium bromide, after passing through a No. 20 sieve, require no other treatment than a little drying before compression.

## TABLETTÆ ACETANILIDI COMPOSITÆ.

## COMPOUND ACETANILIDE TABLETS.

Acetanilide	...	...	12.50 grammes (200 grains)
Caffeine Citrate	...	...	6.25 grammes (100 grains)
Sodium Bicarbonate	...	...	6.25 grammes (100 grains)
Glucose, in powder	...	...	1.50 grammes (25 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the powders, dissolve the glucose in one and a-half times its weight of theobroma emulsion in a warm mortar, add the mixed powders and produce granulation, using more of the theobroma emulsion if necessary, dry, and make into 100 tablets.

These tablets resemble some nostrums advertised for neuralgia and headache. The indiscriminate use of acetanilide always represents a certain element of danger.

*Dose.*—1 or 2 tablets.



**TABLETTÆ ACETANILIDI COMPOSITÆ CUM CODEINA.**

COMPOUND ACETANILIDE TABLETS WITH CODEINE.

Acetanilide	...	...	12.50 grammes (200 grains)
Caffeine Citrate	...	...	6.25 grammes (100 grains)
Sodium Bicarbonate	...	...	6.25 grammes (100 grains)
Codeine	...	...	1.05 grammes (16½ grains)
Glucose, in powder	...	...	1.50 grammes (25 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the powders, dissolve the glucose in one and a-half times its weight of theobroma emulsion in a warm mortar, add the mixed powders and produce granulation, using more of the theobroma emulsion if necessary, dry, and make into 100 tablets.

These tablets are employed to allay pain, especially of ovarian or uterine origin.

*Dose.*—1 or 2 tablets.

**TABLETTÆ ACIDI SALACETICI.**

..... SALACETIC ACID TABLETS.

Salacetic Acid	...	...	32.00 grammes (500 grains)
Gum Acacia, in powder	...	...	4.00 grammes (60 grains)
Potato Starch (dried)	...	...	2.00 grammes (30 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the salacetic acid and gum acacia, granulate with the theobroma emulsion, dry, add the starch to the dried granules, and make into 100 tablets.

These tablets are used in all forms of rheumatism, sodium salicylate being liberated and absorbed in the duodenum.

*Dose.*—1 to 3 tablets.

**TABLETTÆ ALOES ET FERRI.**

ALOES AND IRON TABLETS.

Exsiccated Ferrous Sulphate	...	3.50 grammes (52½ grains)
Barbados Aloes, in powder	...	7.00 grammes (105 grains)
Compound Powder of Cinnamon	...	10.50 grammes (157 grains)
Refined Sugar, in powder	...	9.0 grammes (135 grains)
Ethereal Solution of Theobroma	...	5.50 mils (82 minims)
Alcohol, 45 per cent.	...	2.00 mils (30 minims)

Mix the powders, add the ethereal solution of theobroma, and granulate with the alcohol, dry, and make into 100 tablets.

Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dose.*—1 to 2 tablets.

**TABLETTÆ ALOES ET MYRRHÆ.**

## ALOES AND MYRRH TABLETS.

Socotrine Aloes, in powder	...	13.75 grammes	(210 grains)
Myrrh, in powder	...	7.00 grammes	(105 grains)
Refined Sugar, in powder	...	10.00 grammes	(150 grains)
Ethereal Solution of Theobroma		4.50 mils	(68 minims)
Alcohol	...	1.50 mils	(23 minims)

Mix the powders, granulate with the mixed liquids, dry, and make into 100 tablets.

Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dose.*—1 to 2 tablets.

**TABLETTÆ ALOES ET NUCIS VOMICÆ ET BELLADONNÆ.**

## ALOES, NUX VOMICA, AND BELLADONNA TABLETS.

Barbados Aloes, in powder	...	12.50 grammes	(200 grains)
Extract of Nux Vomica	...	1.50 grammes	(25 grains)
Alcoholic Extract of Belladonna		1.05 grammes	(16 $\frac{2}{3}$ grains)
Refined Sugar, in powder	...	6.25 grammes	(100 grains)
Ethereal Solution of Theobroma		3.00 mils	(45 minims)
Alcohol	...	1.00 mil	(15 minims)

Mix the powders, granulate with the mixed liquids, dry, and make into 100 tablets.

These tablets are given for chronic constipation.

*Dose.*—1 to 2 tablets.

**TABLETTÆ ALOINI COMPOSITÆ.**

## COMPOUND ALOIN TABLETS.

Aloin	...	3.25 grammes	(50 grains)
Ipecacuanha, in powder	...	1.50 grammes	(25 grains)
Extract of Nux Vomica	...	8.00 decigrams	(12 $\frac{1}{2}$ grains)
Refined Sugar, in powder	...	3.00 grammes	(50 grains)
Theobroma Emulsion	...	6.00 decigrams	(10 grains)
Distilled Water, a sufficient quantity.			

Mix the powders and thoroughly incorporate the theobroma emulsion, then complete the granulation with distilled water, dry, and make into 100 tablets.

These tablets are given for chronic constipation.

*Dose.*—1 to 2 tablets.

NOTE.—Weaker compound tablets of aloin may also be prepared, containing only  $\frac{1}{10}$  or  $\frac{1}{8}$  grain of aloin in each.

**TABLETTÆ ANTIPYRINÆ.****ANTIPYRINE TABLETS.**

Antipyrine, in No. 20 crystals... 32·00 grammes (500 grains)

Purified Talc ... 65·00 centigrams (10 grains)

Sift the purified talc over the antipyrine, mix thoroughly by shaking together in a suitable vessel, and make into 100 tablets.

These tablets are employed to relieve headache and neuralgias, and to a small extent to reduce temperature.

*Dose.*—1 to 3 tablets.

**TABLETTÆ BISMUTHI ET SODII BICARBONATIS.****BISMUTH AND SODIUM BICARBONATE TABLETS.**

Sodium Bicarbonate... 18·75 grammes (300 grains)

Bismuth Oxycarbonate ... 12·50 grammes (200 grains)

Gum Acacia, in powder ... 2·60 grammes (40 grains)

Purified Talc... 78·00 centigrams (12 grains)

Distilled Water, a sufficient quantity.

Mix the powders, granulate with the water, dry, and make into 100 tablets.

These tablets are used in gastric catarrh.

*Dose.*—1 to 3 tablets.

**TABLETTÆ CASCARÆ SAGRADÆ.****CASCARA SAGRADA TABLETS.**

Extract of Cascara Sagrada ... 12·50 grammes (200 grains)

Potato Starch ... 3·00 grammes (50 grains)

Ethereal Solution of Theobroma 2·50 mls (40 minims)

Alcohol ... 5·00 decimils (9 minims)

Mix the extract of cascara with starch, granulate with the mixed liquids, and make into tablets containing 6, 12, 18, or 30 centigrams (1, 2, 3, or 5 grains).

These tablets are employed in habitual constipation.

*Dose.*—6 to 60 centigrams (1 to 10 grains).

**TABLETTÆ COLOCYNTHIDIS COMPOSITÆ.****COMPOUND COLOCYNTH TABLETS.**

Colocynth Pulp, in powder ... 5·50 grammes (84 grains)

Barbados Aloes, in powder ... 11·00 grammes (168 grains)

Scammony Resin, in powder ... 11·00 grammes (168 grains)

Potassium Sulphate, in powder 1·375 grammes (21 grains)

Oil of Cloves ... 15·00 decimils (23 minims)

Ethereal Solution of Theobroma 4·00 mls (60 minims)

Alcohol (80 per cent.), a sufficient quantity.

Mix the powders, then add the oil of cloves and the ethereal solution of theobroma, and granulate with the alcohol, dry, and make into 100 tablets.



Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dose.*—1 to 2 tablets.

### TABLETTÆ ERYTHROL NITRATIS.

#### ERYTHROL NITRATE TABLETS.

*Synonym.*—Compressed Erythrol Tablets.

Erythrol Tetranitrate, in powder	3.00 grammes ( 50 grains)
Cocoa, in powder ... ..	6.25 grammes (100 grains)
Gum Acacia, in powder ... ..	3.00 grammes ( 50 grains)
Refined Sugar, in powder ... ..	12.50 grammes (200 grains)
Ethereal Solution of Theobroma	8.00 mls (2 fluid drachms)
Alcohol (45 per cent.), a sufficient quantity.	

Mix the powders, then add the ethereal solution of theobroma, and granulate with the alcohol, dry, and make into 100 tablets.

Tablets of erythrol nitrate are a convenient means of administering the drug (see also *Tabellæ Erythrolis*). They should be chewed in the mouth, not swallowed whole.

*Dose.*—1 or 2 tablets.

### TABLETTÆ FERRI.

#### IRON TABLETS.

*Synonym.*—Blaud's Tablets.

(a) Exsiccated Ferrous Sulphate ...	9.75 grammes (150 grains)
Refined Sugar, in powder ... ..	8.75 grammes (135 grains)
Gum Acacia, in powder ... ..	1.60 grammes ( 25 grains)
Theobroma Emulsion, with Acacia	4.00 grammes ( 60 grains)

Granulate and dry thoroughly by the application of heat.

(b) Sodium Bicarbonate ... ..	9.75 grammes (150 grains)
Theobroma Emulsion, with Acacia	2.50 grammes ( 35 grains)

Granulate the sodium bicarbonate with the theobroma (acacia) emulsion, and dry thoroughly with heat. Mix (a) and (b) and make into 100 tablets.

These tablets are used as a hæmatinic in anæmia.

Each 3-decigram (5-grain) tablet yields, on moistening, 6 centigrams (1 grain) of ferrous carbonate.

*Dose.*—1 to 3 tablets.

### TABLETTÆ FERRI CARBONATIS.

#### FERROUS CARBONATE TABLETS.

*Synonym.*—Iron Carbonate Tablets.

Ferrous Carbonate with Glucose	10.80 grammes (166 $\frac{2}{3}$ grains)
Starch, in powder ... ..	3.6 grammes ( 56 grains)
Liquid Glucose, a sufficient quantity.	
Distilled Water, a sufficient quantity.	
Ethereal Solution of Theobroma	2 mls (30 minims)

Mix the ferrous carbonate and starch, add the ethereal solution of theobroma, mix, and granulate with a mixture of 3 of liquid glucose and 1 of distilled water by thoroughly triturating and sifting; dry the granules and make into 100 tablets, each of which should contain about 6 centigrams (1 grain) of ferrous carbonate.

NOTES.—Each tablet is approximately equal to 3 decigrams (5 grains) of *Pilula Ferri*, B.P. Larger tablets are sometimes required, containing the equivalent of 6 to 10 decigrams (10 to 15 grains) of *Pilula Ferri*.

### TABLETTÆ GALBANI COMPOSITÆ.

#### COMPOUND GALBANUM TABLETS.

*Synonym.*—Compound Asafetida Tablets.

Asafetida	...	...	9.00 grammes (143 grains)
Galbanum	...	...	9.00 grammes (143 grains)
Myrrh	...	...	9.00 grammes (143 grains)
Refined Sugar	...	...	9.00 grammes (143 grains)
Ethereal Solution of Theobroma	...	...	1.80 mls (30 minims)
Alcohol	...	...	6.00 decimils (10 minims)

Reduce the asafetida, galbanum, and myrrh to powder with the aid of the sugar, then granulate with the mixed liquids, dry, and make into 100 tablets.

Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dosē.*—1 or 2 tablets.

### TABLETTÆ GLUSIDI.

#### GLUSIDE TABLETS.

*Synonyms.*—Tablettæ Saccharini; Saccharin Tablets.

Gluside	...	...	3.25 grammes (50 grains)
Sodium Bicarbonate	...	...	3.00 grammes (45 grains)
Theobroma Emulsion,	a sufficient quantity.		

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

Gluside tablets are used in place of sugar to sweeten tea, coffee, etc.

### TABLETTÆ HYDRARGYRI CUM CRETA.

#### MERCURY TABLETS WITH CHALK.

Mercury with Chalk	...	...	6.25 grammes (100 grains)
Refined Sugar, in powder	...	...	10.25 grammes (165 grains)
Potato Starch	...	...	1.25 grammes (20 grains)
Theobroma Emulsion,	a sufficient quantity.		

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

These tablets are given to children as a purge and intestinal antiseptic.

*Dose.*—1 to 5 tablets.

NOTE.—These tablets should be lightly compressed, so that they can easily be crushed between the fingers, and administered as powders.

**TABLETTÆ HYDRARGYRI SUBCHLORIDI.**

## MERCUROUS CHLORIDE TABLETS.

*Synonym.*—Calomel Tablets.

Mercurous Chloride	...	...	12.50 grammes (200 grains)
Refined Sugar, in powder	...	...	2.50 grammes ( 40 grains)
Potato Starch	...	...	1.00 gramme ( 15 grains)
Ethereal Solution of Theobroma		2.00 mls	(30 minims)
Alcohol (45 per cent.)	a sufficient quantity.		

Mix the powders, and incorporate the ethereal solution of theobroma, then granulate with the alcohol, dry, and make into 100 tablets.

These tablets are used as a purge and intestinal antiseptic.

*Dose.*—1 to 2 tablets.

NOTE.—Weaker tablets of mercurous chloride may also be prepared, containing only  $\frac{1}{10}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , or 1 grain of mercurous chloride in each.

**TABLETTÆ HYDRARGYRI SUBCHLORIDI COMPOSITÆ.**

## COMPOUND MERCUROUS CHLORIDE TABLETS.

*Synonym.*—Compound Calomel Tablets.

Mercurous Chloride	...	...	7.00 grammes (109 grains)
Sulphurated Antimony	...	...	7.00 grammes (109 grains)
Guaiacum Resin	...	...	14.00 grammes (219 grains)
Refined Sugar, in powder	...	...	1.50 grammes ( 23 grains)
Theobroma Emulsion,	a sufficient quantity.		

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dose.*—1 to 2 tablets.

**TABLETTÆ IPECACUANHÆ CUM SCILLA.**

## IPECACUÂNHA TABLETS WITH SQUILL.

Compound Powder of Ipecacuanha	12.50 grammes (200 grains)
Squill, in powder	4.15 grammes ( 67 grains)
Ammoniacum, in powder	4.15 grammes ( 67 grains)
Refined Sugar, in powder	3.50 grammes ( 54 grains)
Theobroma Emulsion,	a sufficient quantity.

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

Each tablet is approximately equal to  $2\frac{1}{2}$  decigrams (4 grains) of the corresponding official pill mass.

*Dose.*—1 to 2 tablets.



**TABLETTÆ NITROGLYCERINI.****NITROGLYCERIN TABLETS.**

*Synonyms.*—Tablettæ Trinitrini; Trinitrin Tablets; Compressed Nitroglycerin or Trinitrin Tablets.

Solution of Trinitrin	...	...	6.50 mils	(110 minims)
Cocoa, in powder	...	...	6.25 grammes	(100 grains)
Refined Sugar, in powder	...	...	16.75 grammes	(260 grains)
Gum Acacia, in powder	...	...	2.50 grammes	(40 grains)
Theobroma Emulsion, a sufficient quantity.				

Mix the solution of trinitrin with the cocoa, and allow the alcohol to evaporate, add the sugar and gum, then granulate with the theobroma emulsion, dry, and make into 100 tablets.

These tablets are a convenient means of administering nitroglycerin (see also Tabellæ Trinitrini). The tablets should be chewed, not swallowed whole.

*Dose.*—1 to 2 tablets.

**TABLETTÆ OPII.****OPIUM TABLETS.**

Opium, in powder	...	...	6.25 grammes	(100 grains)
Refined Sugar, in powder	...	...	3.00 grammes	(45 grains)
Ethereal Solution of Theobroma	...	...	1.25 mils	(20 minims)
Alcohol (60 per cent.), a sufficient quantity.				

Mix the powders, add the ethereal solution of theobroma, then granulate with the alcohol, dry, and make into 100 tablets.

*Dose.*—1 to 2 tablets.

**TABLETTÆ PEPSINÆ.****PEPSIN TABLETS.**

Pepsin, in powder	...	...	16.00 grammes	(250 grains)
Milk Sugar, in powder	...	...	15.00 grammes	(235 grains)
Ethereal Solution of Theobroma	...	...	6.00 mils	(90 minims)
Alcohol (80 per cent.), a sufficient quantity.				

Mix the powders, add the ethereal solution of theobroma, mix, and granulate with the alcohol, dry, and make into tablets containing  $1\frac{1}{2}$  or 3 decigrams ( $2\frac{1}{2}$  or 5 grains) of pepsin.

*Dose.*—1 to 2 tablets.

**TABLETTÆ PHENACETINI.****PHENACETIN TABLETS.**

Phenacetin	...	...	32.00 grammes	(500 grains)
Glucose, in powder	...	...	3.20 grammes	(50 grains)
Potato Starch (dried)	...	...	2.25 grammes	(35 grains)
Theobroma Emulsion, a sufficient quantity.				

Dissolve the glucose in an equal weight of theobroma emulsion in a warm mortar, add the phenacetin, granulate, dry, add the starch to the dried granules, and make into 100 tablets.

*Dose.*—1 to 2 tablets.

**TABLETTÆ PHENOLPHTHALEINI COMPOSITUS.****COMPOUND PHENOL-PHTHALEIN TABLETS.**

Phenol-phthalein	...	...	6.25 grammes	(100 grains)
Green Extract of Belladonna	...	...	6.00 centigrams	(1 grain)
Strychnine Sulphate	...	...	12.00 milligrams	( $\frac{1}{5}$ grain)
Starch, in powder	...	...	6.00 decigrams	(10 grains)
Milk Sugar	...	...	1.90 grammes	(30 grains)

Theobroma Emulsion, a sufficient quantity.

Granulate, dry, and make into 100 tablets.

These tablets are used in habitual constipation.

*Dose.*—1 to 5 tablets.

*NOTE.*—These tablets contain  $\frac{1}{500}$  grain of strychnine sulphate in each.

**TABLETTÆ PLUMBI CUM OPIO.****LEAD TABLETS WITH OPIUM.**

Lead Acetate, in fine powder	18.75 grammes	(300 grains)
Opium, in powder	3.125 grammes	(50 grains)
Refined Sugar, in powder	6.25 grammes	(100 grains)
Ethereal Solution of Theobroma	4.00 mils	(60 minims)
Alcohol...	1.00 mil	(15 minims)

Mix the powders, granulate with the mixed liquids, dry, and make into 100 tablets.

Each tablet is approximately equal to  $2\frac{1}{2}$  decigrams (4 grains) of the corresponding official pill mass.

*Dose.*—1 tablet.

**TABLETTÆ PODOPHYLLI COMPOSITÆ.****COMPOUND PODOPHYLLUM TABLETS.**

*Synonym.*—Compound Podophyllin Tablets.

Podophyllum Resin	...	...	1.50 grammes	(25 grains)
Mercurous Chloride	...	...	6.25 grammes	(100 grains)
Alcoholic Extract of Bella-	...	...	...	...
donna...	...	...	1.05 grammes	(16 $\frac{2}{3}$ grains)

Theobroma Emulsion, a sufficient quantity.

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

*Dose.*—1 to 2 tablets.

**TABLETTÆ POTASSII BROMIDI.****POTASSIUM BROMIDE TABLETS.**

Potassium Bromide, in No. 20

powder ... 30.00 grammes (500 grains)

Dry by the application of heat and make into 100 tablets.

These tablets should be dissolved in water before swallowing.

*Dose.*—2 to 6 tablets.

**TABLETTÆ POTASSII CHLORATIS.**

POTASSIUM CHLORATE TABLETS.

Potassium Chlorate, in No. 20

powder	...	...	...	30.00 grammes (500 grains)
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Dry by the application of heat, and make into 100 tablets.

These tablets are sucked slowly for inflamed and ulcerated throats, and in stomatitis.

**TABLETTÆ POTASSII CHLORATIS ET BORACIS.**

POTASSIUM CHLORATE AND BORAX TABLETS.

Potassium Chlorate, in No. 20

powder...	...	...	18.75 grammes (300 grains)
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Borax, in powder	...	...	12.50 grammes (200 grains)
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Mix the powders, and make into 100 tablets.

These tablets are sucked slowly for stomatitis, and for inflamed and ulcerated throats.

**TABLETTÆ POTASSII CHLORATIS ET BORACIS CUM COCAINA.**

POTASSIUM CHLORATE AND BORAX TABLETS WITH COCAINE.

*Synonym.*—Voice Tablets.

Potassium Chlorate, in No. 20

powder	...	...	...	19.00 grammes (300 grains)
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Borax, in powder	...	...	12.5 grammes (200 grains)
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Cocaine Hydrochloride	...	...	32.5 centigrams (5 grains)
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Mix the powders, and make into 100 tablets.

These tablets are sucked slowly for inflamed and irritable throat.

**TABLETTÆ QUININÆ ET FERRI.**

QUININE AND IRON TABLETS.

*Synonym.*—Tablettæ Quininæ cum Ferro.

Quinine Sulphate	...	...	6.25 grammes (100 grains)
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Exsiccated Ferrous Sulphate...	...	6.25 grammes (100 grains)
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Refined Sugar, in powder	...	3.125 grammes (50 grains)
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Glucose, in powder	...	1.50 grammes (25 grains)
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Theobroma Emulsion, a sufficient quantity.

Dissolve the glucose in one and a-half times its weight of theobroma emulsion in a warm mortar, add the mixed powders, granulate, dry, and make into 100 tablets,

*Dose.*—1 to 3 tablets,



**TABLETTÆ QUININÆ.****QUININE TABLETS.**

Quinine Sulphate	...	...	12.50 grammes (200 grains)
Gum Acacia, in powder	...	...	2.00 grammes ( 30 grains)
Glucose, in powder	...	...	1.25 grammes ( 20 grains)
Potato Starch (dried)	...	...	1.50 grammes ( 25 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the quinine sulphate with the gum, and dissolve the glucose in one and a-half times its weight of theobroma emulsion in a warm mortar, add the mixed powders, granulate, and dry; then add the starch to the dried granules, and make into tablets containing 6, 12, or 30 centigrams (1, 2, or 5 grains) of quinine sulphate.

*Dose.*—6 to 60 centigrams (1 to 10 grains).

**TABLETTÆ RHEI COMPOSITÆ.****COMPOUND RHUBARB TABLETS.**

Rhubarb Root, in powder	...	...	8.50 grammes (132 grains)
Socotrine Aloes, in powder	...	...	6.30 grammes ( 98 grains)
Myrrh, in powder	...	...	4.20 grammes ( 65 grains)
Oil of Peppermint	...	...	6.00 decimils ( 9 minims)
Refined Sugar, in powder	...	...	12.00 grammes (186 grains)
Ethereal Solution of Theobroma	...	...	3.50 mls (54 minims)
Alcohol	...	...	2.25 mls (36 minims)

Mix the oil with the powders, granulate with the mixed liquids, dry, and make into 100 tablets.

Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dose.*—1 or 2 tablets.

**TABLETTÆ RHEI ET SODÆ.****RHUBARB AND SODA TABLETS.**

Rhubarb Root, in powder	...	...	18.75 grammes (300 grains)
Sodium Bicarbonate	...	...	9.40 grammes (150 grains)
Ginger, in powder	...	...	3.20 grammes ( 50 grains)
Gum Acacia, in powder	...	...	1.50 grammes ( 25 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

*Dose.*—1 or 2 tablets.

**TABLETTÆ SANTONINI COMPOSITÆ.****COMPOUND SANTONIN TABLETS.**

Santonin	...	...	6.25 grammes (100 grains)
Mercurous Chloride	...	...	6.25 grammes (100 grains)
Cocoa, in powder	...	...	6.25 grammes (100 grains)
Refined Sugar, in powder	...	...	6.25 grammes (100 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the powders, granulate with the theobroma emulsion, dry, and lightly compress into 100 tablets.

These tablets are used to expel round and thread worms in children.

*Dose.*—1 to 2 tablets.

### TABLETTÆ SAPONIS COMPOSITÆ.

#### COMPOUND SOAP TABLETS.

Opium, in powder	...	...	6.25 grammes (100 grains)
Hard Soap, in powder...	...	...	19.00 grammes (300 grains)
Refined Sugar, in powder	...	...	6.25 grammes (100 grains)
Alcohol (60 per cent.) a sufficient quantity.			

Mix the powders, granulate with the alcohol, dry, and make into 100 tablets.

Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dose.*—1 tablet.

### TABLETTÆ SCILLÆ COMPOSITÆ.

#### COMPOUND SQUILL TABLETS.

Squill, in powder	...	...	7.50 grammes (120 grains)
Ginger, in powder	...	...	6.00 grammes (95 grains)
Ammoniacum in powder	...	...	6.00 grammes (95 grains)
Hard Soap, in powder...	...	...	6.00 grammes (95 grains)
Refined Sugar, in powder	...	...	6.00 grammes (95 grains)
Alcohol (45 per cent.), a sufficient quantity.			

Mix the powders, granulate with the alcohol, dry, and make into 100 tablets.

Each tablet is approximately equal to 3 decigrams (5 grains) of the corresponding official pill mass.

*Dose.*—1 or 2 tablets.

### TABLETTÆ SODII BICARBONATIS COMPOSITÆ.

#### COMPOUND SODIUM BICARBONATE TABLETS.

##### *Synonym.*—Soda Mint Tablets.

Sodium Bicarbonate	...	...	32.00 grammes (500 grains)
Ammonium Carbonate, in powder	...	...	7.50 decigrams (11½ grains)
Gluside	...	...	13.00 centigrams (2 grains)
Gum Acacia, in powder	...	...	1.75 grammes (27 grains)
Oil of Peppermint	...	...	7.50 decimils (12½ minims)
Theobroma Emulsion, a sufficient quantity.			

Mix the sodium bicarbonate, gluside, gum acacia, and oil of peppermint, granulate with the theobroma emulsion, dry, add the ammonium carbonate, mix thoroughly by shaking in a wide-mouthed bottle, and make into 100 tablets.

These tablets are used as an antacid and carminative in gastric flatulence.

*Dose.*—1 to 4 tablets.

### TABLETTÆ SULPHONALI.

#### SULPHONAL TABLETS.

Sulphonal	...	...	32.00 grammes (500 grains)
Glucose, in powder	...	...	3.20 grammes (50 grains)
Potato Starch	...	...	2.25 grammes (35 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the sulphonal and starch. Dissolve the glucose in 90 grains of theobroma emulsion, add the mixed powders and produce granulation, using more theobroma emulsion if necessary, dry, and make into 100 tablets.

These tablets should be broken up or chewed, and swallowed with a draught of hot liquid.

*Dose.*—1 to 6 tablets.

### TABLETTÆ SUPRARENALES.

#### SUPRARENAL TABLETS.

Dry Suprenal	...	...	12.50 grammes (200 grains)
Refined Sugar, in powder	...	...	12.50 grammes (200 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

*Dose.*—1 to 4 tablets.

### TABLETTÆ THYROIDEI.

#### THYROID TABLETS.

Dry Thyroid	...	...	12.50 grammes (200 grains)
Refined Sugar, in powder	...	...	12.50 grammes (200 grains)
Theobroma Emulsion, a sufficient quantity.			

Mix the powders, granulate with the theobroma emulsion, dry, and make into 100 tablets.

*Dose.*—1 to 5 tablets.

### TABLETTÆ ZINCI VALERIANATIS COMPOSITÆ.

#### COMPOUND ZINC VALERIANATE TABLETS.

Zinc Valerianate	...	...	6.25 grammes (100 grains)
Asafetida	...	...	3.50 grammes (56½ grains)
Galbanum	...	...	3.50 grammes (56½ grains)
Myrrh	...	...	3.50 grammes (56½ grains)
Refined Sugar, in powder	...	...	2.50 grammes (40 grains)
Ethereal Solution of Theobroma	...	...	5.00 mils (80 minims)
Alcohol	...	...	5.00 decimils (10 minims)



Reduce the asafetida, galbanum, and myrrh to powder with the aid of the sugar, add the zinc valerianate, mix and granulate with the mixed liquids; then dry, and make into 100 tablets.

These tablets are used in hysteria and neurotic disorders.

*Dose.*—1 to 3 tablets.

## TABLETTÆ ZINGIBERIS COMPOSITÆ.

### COMPOUND GINGER TABLETS.

*Synonym.*—Ginger Mint Tablets.

Oleoresin of Ginger ...	... 80.00 decigrams	( 12½ grains)	8.00 dec
Sodium Bicarbonate ...	... 32.00 grammes	(500 grains)	
Ammonium Carbonate, in powder	7.50 decigrams	( 11½ grains)	
Gluside ...	... 13.00 centigrams	( 2 grains)	
Gum Acacia, in powder ...	1.75 grammes	( 27 grains)	
Oil of Peppermint ...	7.50 decimils	(12½ minims)	
Theobroma Emulsion, a sufficient quantity.			

Mix the sodium bicarbonate, gluside, gum acacia, oleoresin of ginger, and oil of peppermint, granulate with the theobroma emulsion, dry, add the ammonium carbonate, mix thoroughly by shaking in a wide-mouthed bottle, and make into 100 tablets.

*Dose.*—1 or 2 tablets.

## TALCUM.

### TALC.

*Synonyms.*—Creta Gallica; French Chalk; White Fullers Earth. Talc is a native hydrated silicate of magnesium, and is usually purified before use.

It occurs as a white or greyish-white powder or greyish-green irregular masses of waxy lustre, without taste or odour, permanent in air. Rubbed upon the skin it imparts a feeling of greasiness. Insoluble in water, and in dilute solutions of the acids and alkali hydroxides. Specific gravity, 2.2 to 2.8. If 1 gramme be boiled with 25 mls of diluted hydrochloric acid for thirty minutes, water being added from time to time to replace that lost by evaporation, the filtrate should yield, when evaporated, ignited and quickly weighed, not more than 5 centigrams of residue.

Commercial native talc, although largely used for technical purposes, is not suitable for pharmaceutical work on account of the impurities present. If required for this purpose, purified talc should be employed.

## TALCUM PURIFICATUM.

### PURIFIED TALC.

Talc, in fine powder ...	... 100.00
Hydrochloric Acid ...	15.00
Distilled Water, a sufficient quantity.	

Mix the powdered talc with about 500 of boiling water, gradually add 10 mls of the acid, and boil the mixture for fifteen minutes,

then set aside for fifteen minutes. Decant and reject the supernatant liquid containing the finer particles of talc in suspension, and again boil the residue with 500 of the water mixed with the remainder of the acid, set aside for fifteen minutes. Again decant and reject the supernatant liquid, and wash the residue with distilled water until quite free from chlorides. Transfer the magma to a linen strainer, drain, and dry at a temperature of  $110^{\circ}$ .

The product occurs as a white, tasteless and odourless powder, which is permanent in air. When subjected to ignition at a red heat it should lose not more than 5 per cent. of its weight. If 10 grammes be boiled with 50 mls of distilled water for thirty minutes, water being added from time to time to replace that lost by evaporation, the filtrate should be neutral to litmus, and 25 mls of this filtrate, when evaporated and dried at  $110^{\circ}$ , should yield not more than 5 milligrams of residue (limit of soluble substances). The remaining half of the filtrate, after slightly acidulating with hydrochloric acid, should not yield a blue colour on the addition of potassium ferrocyanide (absence of iron).

Purified talc in the finest powder is used as a dusting powder to allay irritation and prevent chafing from friction; for this purpose it is often mixed with zinc oxide, boric acid, or starch, and suitably perfumed. It is also used as an aid in filtering turbid liquids containing finely-divided matters in suspension, which are apt to pass through the filter, or to stop up its pores. For this purpose the powder should not be too fine. A No. 60 powder, or perhaps No. 80 powder, is much superior to the finer bolted varieties used for dusting purposes.

## TAMARINDUS.

### TAMARINDS.

*Synonyms.*—Tamarind; West Indian Tamarinds.

Tamarinds are the fruits of *Tamarindus indica*, Linn. (N.O. Leguminosæ), freed from the brittle, outer part of the pericarp and preserved with sugar. The tamarind tree is indigenous to Africa, but is cultivated throughout India and the West Indies.

The fruit is a legume from 2 to 8 inches long, and consists of a rough, brownish epicarp, pulpy mesocarp, through which stout branching fibres pass, and several large, brown, hard seeds, each enclosed in a tough, leathery endocarp. The fruits, freed from their epicarps, are preserved by pouring hot syrup on them and then form the official drug, which is usually imported from the West Indies and known as West Indian tamarinds. It forms a reddish-brown, moist, sugary mass, in which the fibres and the seeds enclosed in the endocarp are conspicuous.

The pulp of the fruit has a strongly acid taste and contains chiefly tartaric acid (about 10 per cent.), acid potassium tartrate (about 8 per cent.), and invert sugar (about 30 per cent.). The total acidity

varies from 11 to 16 per cent. The official tamarinds contain, in addition to the constituents of the fruits, the cane sugar which has been used in the form of syrup to preserve the pulp.

Tamarinds are mildly laxative; infused with water it forms an agreeable drink for use in fevers. Mixed with milk (1 in 40) it forms tamarind whey. Tamarind pastilles are a slightly acid, emollient application for the throat.

NOTES.—Tamarind pulp is largely exported from India (East Indian tamarinds); this variety consists of the shelled legumes pressed into a firm, black mass, without the addition of either sugar or salt as a preservative.

## TARAXACI RADIX.

DANDELION ROOT.

*Synonym.*—*Taraxacum*.

Dandelion root is obtained from the common dandelion, *Taraxacum officinale*, Wiggers (N.O. Compositæ). It is collected in the autumn, and used both fresh and dried.

The fresh root is yellowish-white in colour and often 30 centimetres or more in length and 12 millimetres or more in diameter. It is fleshy, breaks with a short fracture and exhibits a white interior, a very bitter, milky juice exuding from concentric circles of laticiferous vessels. The dried root is dark brown, much shrivelled, and exhibits in transverse section a small, yellow wood surrounded by a large, whitish cortex in which dark concentric lines of laticiferous vessels are easily seen. Towards the upper part the root passes into an erect rhizome, which often branches, each branch being crowned with the short remains of leaves, near the insertion of which brownish hairs may be seen. It has a bitter taste, but no odour.

The root contains a small quantity of a bitter principle, taraxacin; it also contains a waxy substance, taraxacerin, two resins, and variable quantities of sugar and inulin. In the dried root the latter is present in the parenchymatous cells of the cortex, in the form of amorphous or sub-crystalline masses, which are insoluble in cold water. In the fresh root the inulin is dissolved in the cell-sap and remains in solution when the juice is expressed from the crushed root. The autumnal root is generally considered to be more bitter than the spring root, and as, when dried, it contains insoluble inulin (about 25 per cent.), is to be preferred on this account also to the spring root, which contains soluble sugar (about 18 per cent. of lævulin and 17 per cent. of uncrystallisable sugar). Taraxacin is unstable and easily oxidised, yielding oxalic acid, hence the juice of the fresh root rapidly loses its bitter taste. Dried taraxacum root yields from 3 to 5 per cent. of ash.

Dandelion root is used as a bitter in atonic dyspepsia and as a mild laxative in habitual constipation; it has been erroneously stated to have some action on the liver. The dried root is used in the



preparation of *Extractum Taraxaci Liquidum*, but the most active preparations are those made from the fresh root, *Extractum Taraxaci* and *Succus Taraxaci*.

## TEREBENUM.

### TEREBENE.

Terebene is a mixture of hydrocarbons, of complex and somewhat variable composition. It consists of polymerides and isomerides of the empirical formula  $C_{10}H_{16}$ , chiefly dipentene, which is the optically inactive modification of limonene, and terpinene; but it also contains camphene, cymene, and small quantities of oxidation products formed during the process of manufacture. The composition of the liquid necessarily varies with the constituents of the oil from which the terebene is prepared. It may be prepared by thoroughly mixing 1000 of rectified or redistilled oil of turpentine with 50 of sulphuric acid, in successive small quantities. When the heat generated after one addition of acid has moderated to about  $70^{\circ}$ , the process is repeated with a further addition of acid, until the whole of the acid has been added. The mixture is shaken at intervals for a short time and then put aside for twenty-four hours. The oil is separated and washed with dilute solution of sodium hydroxide, or treated with chalk to remove all traces of acid, dried over calcium chloride and distilled in a brisk current of steam. The distillate should be optically inactive; if not, treatment with acid in the proportion of 5 to 100 is repeated.

Recently distilled terebene is a colourless, transparent, mobile, liquid, which is optically inactive and neutral, with a characteristic, agreeable odour and an aromatic, terebinthinate taste. Very sparingly soluble in water; soluble in alcohol (1 in  $6\frac{1}{2}$ ); in ether (1 in  $3\frac{3}{4}$ ); in glacial acetic acid (5 in 8); in all proportions of absolute alcohol and chloroform; also soluble in carbon bisulphide, cod-liver oil, and liquid paraffin. Specific gravity, 0.862 to 0.866 (about 0.850 at  $25^{\circ}$ ). Terebene should distil between  $156^{\circ}$  and  $185^{\circ}$ , and be optically inactive (absence of unaltered oil of turpentine); on exposure, however, to light and air it becomes resinified, acquires a reddish colour, an acid reaction, and optical activity. Not more than 15 per cent. should distil below  $165^{\circ}$ . On evaporating about 10 mls in a porcelain dish on a water-bath not more than a very slight residue should remain (absence of more than traces of resinous substances). Terebene which has become altered by exposure to light and air may be purified by treatment with solution of sodium hydroxide, or lime water, and rectification.

Terebene closely resembles oil of turpentine in its properties, but its odour is more agreeable. It is used as a disinfectant and expectorant either taken internally or as an inhalation, and is especially valuable in chronic bronchitis and phthisis. It may be given on sugar, or enclosed in gelatin capsules; lozenges and pastilles are also prepared. For ordinary administration in mixture form, an

emulsion with tragacanth may be prepared by the usual process for volatile oils (see *Tragacantha*). Terebene is used as an inhalation from an oro-nasal respirator; or a suspension in water (1 in 12) may be made with magnesium carbonate which is added to hot water. Terebene resembles oil of turpentine to the extent that, when taken internally in large doses, it gives rise to albuminuria and hæmaturia (see also under *Oleum Terebinthinæ*).

*Dose*.—3 to 10 decimils (5 to 15 minims).

## TEREBINTHINA CANADENSIS.

CANADA TURPENTINE.

*Synonyms*.—Canada Balsam; Balsam of Fir.

Canada turpentine is an oleoresin obtained from the balsam fir, *Abies balsamea*, Link. (N.O. Coniferæ), a tree indigenous to the United States and Canada. The oleoresin is secreted in schizogenous ducts in the bark, and collects in cavities, which form blisters; the latter are punctured and the oleoresin collected.

It forms a pale yellow, viscid liquid, often exhibiting a slight greenish fluorescence. It has an agreeable, terebinthinate odour, and bitter, acrid taste. It becomes more viscid on keeping, and dries to a hard, transparent varnish that shows no disposition to crystallise. Soluble in all proportions of benzene, chloroform, and ether; freely soluble in oil of turpentine and alcohol. It solidifies when mixed with about one-sixth of its weight of magnesia mixed with a little water.

Canada turpentine consists of a mixture of resin acids (63 per cent.), an indifferent resene (12 per cent.), and volatile oil (24 per cent.). The resin acids are composed of canadinic, canadolic, and  $\alpha$ - and  $\beta$ -canadolinic acids. The volatile oil consists chiefly of lævo-pinene. The specific gravity of the oil is about 0.987 to 0.994; optical rotation,  $+1^{\circ}$  to  $+4^{\circ}$ ; refractive index, 1.518 to 1.521; acid value, 84 to 87.

Canada turpentine is not given internally, but is occasionally employed as a pill excipient with such deliquescent salts as calcium iodide and chloride. It is used in the preparation of flexile collodion and in microscopy as a mounting medium. For the latter purpose, the balsam is warmed in an open dish until a portion of the mass transferred to a slab sets to a brittle solid. It is then dissolved in an equal quantity of xylol or other suitable solvent. Such a solution forms a non-crystallising mounting medium, having a refractive index approximating to that of ordinary glass, and therefore involving a minimum dispersion of light.

**NOTE**.—Terebinthina, U.S.P., is a concrete oleoresin (turpentine) obtained from *Pinus palustris*, Miller, and other species of *Pinus* (N.O. Coniferæ). It occurs in yellowish, opaque, brittle masses, with a terebinthinate odour and taste.

**TEREBINTHINA VENETA FACTITIA.**

FACTITIOUS VENICE TURPENTINE.

Resin	...	...	...	...	...	50'00
Linseed Oil	...	...	...	...	...	30'00
Oil of Turpentine	...	...	...	...	...	20'00

Melt together the resin and the oil, remove from the source of heat, and stir in the turpentine.

The properties of this mixture resemble those of oil of turpentine, and the preparation is sometimes given internally as a diuretic. It is, however, used chiefly in the arts, and in veterinary medicine.

*Dose.*—2 decigrams (3 grains).

**TERPINEOL.**

TERPINEOL.



*Synonyms.*—Lilacin; Terpinenol.

Terpineol,  $\text{C}_{10}\text{H}_{17}\text{OH}$ , is a monohydrated alcohol, occurring naturally in the free state in *Erigeron canadensis*, Linn., and as the acetate in cajeput, cardamom, and other oils. It is a product of the fractional distillation of terpinol, and may be prepared by heating terpin hydrate with very dilute sulphuric acid (0·1 per cent.), and purifying the resulting terpineol by crystallisation and fractionation. Terpineol occurs, in commerce, in two forms, liquid and crystalline, the former having the finer odour. The liquid variety is in all probability not an individual substance, but a mixture of isomeric compounds, or merely terpineol with traces of impurities which prevent its crystallisation.

It occurs usually as a viscid liquid, colourless, and having a strong, pleasant odour of hyacinths and lilac, and a bitter, feebly pungent taste. Nearly insoluble in water; readily soluble in alcohol and in ether. Specific gravity, about 0·940 to 0·945. Boiling-point, 215° to 218°. Optically inactive. The solid body melts at 35°, and easily remains in a state of superfusion. A synthetic, isomeric terpineol has been prepared, melting at 69° to 70°. In contact with diluted acids, terpineol is converted into terpin hydrate. Heated with potassium hydrogen sulphate, at 200°, dipentene is produced.

Terpineol is largely used in perfumery, and as a means of covering the odour of iodoform. It should be kept in well-stoppered, dark-coloured bottles.

**TERPINI HYDRAS.**

TERPIN HYDRATE.



*Synonyms.*—TERPENE HYDRATE; TERPINE.

Terpin hydrate,  $\text{C}_{10}\text{H}_{18}(\text{OH})_2\text{H}_2\text{O}$ , the hydrate of the dihydroxy alcohol, terpin,  $\text{C}_{10}\text{H}_{18}(\text{OH})_2$ , may be prepared by mixing 35 of



nitric acid with 11 parts of water, allowing the mixture to cool, pouring into a shallow dish, and adding 50 parts of 85 per cent. alcohol and 200 parts of French oil of turpentine, dipentene, or limonene. The dish is loosely covered and set aside for several days in a cool place (not above  $15^{\circ}$  to  $20^{\circ}$ ), the contents being stirred occasionally. When crystallisation ceases the crystals are collected, more being obtained from the mother liquor by neutralising with sodium hydroxide and again crystallising. The crystals are pressed between blotting-paper, recrystallised from 95 per cent. alcohol, which has been rendered slightly alkaline, to remove adhering acid, and further purified by several recrystallisations from alcohol.

It occurs in the form of colourless, glistening, rhombic prisms, or as a crystalline powder having a slightly aromatic odour and a somewhat bitter taste, optically inactive. Soluble in cold water (1 in 280), in boiling water (1 in 32), in cold alcohol (1 in 14), in boiling alcohol (1 in 2), in cold 60 per cent. alcohol (1 in 46), in ether (about 1 in 100), in chloroform (1 in 200), in boiling glacial acetic acid (1 in 1), in methyl alcohol, amyl alcohol, acetic ether, acetone, benzol, carbon bisulphide; slightly soluble in ethereal oils; insoluble in petroleum ether. Melting-point,  $116^{\circ}$  to  $117^{\circ}$ , with loss of water of crystallisation; at the temperature of boiling water it sublimes, without decomposition, in fine needles. It is rendered anhydrous over sulphuric acid, yielding terpin. The anhydrous terpin melts at  $102^{\circ}$  to  $103^{\circ}$ , and sublimes without decomposition at  $258^{\circ}$ . When ignited it burns with a bright, smoky flame, leaving no residue. It should have no odour of turpentine, and its hot, aqueous solution should not redden blue litmus paper. When a few drops of sulphuric acid are added to its hot, aqueous solution the liquid becomes turbid and acquires a very pleasant odour of lilac derived from the formation of terpinol (identification test); terpineol, cineol, dipentene, etc., are also formed.

The action of terpin hydrate closely resembles that of oil of turpentine. It is used to lessen cough and expectoration in phthisis and chronic bronchitis, and for this purpose may be given in pills massed with glycerin of tragacanth, or as Elixir Pini et Terpini et Acetomorphinæ. It is reputed to possess some action as a remote hæmostatic, and is used to arrest bleeding from the lungs and uterus. Such statements are not supported by any pharmacological property of the drug.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

*NOTE.*—Terpin hydrate should be kept in a cool place to avoid loss of water of crystallisation, of which it contains 9.52 per cent.

## TERPINOL.

### TERPINOL.

Terpinol is a mixture of several terpenes ( $C_{10}H_{16}$ ), such as terpinene, terpinolene, and dipentene, with variable proportions of oxygenated bodies (terpineol and cineol), prepared by distilling 100

parts of terpin hydrate with 500 parts of 10 per cent. sulphuric acid. An oily liquid passes over between  $160^{\circ}$  and  $220^{\circ}$ . The product varies in composition, according to the strength of the acid used. It should not be confused with terpineol.

Terpinol occurs as a colourless or nearly colourless, oily liquid, having a strong odour of hyacinths. Insoluble, or nearly so, in water; readily soluble in alcohol and in ether. Specific gravity, 0.852 or more; boiling-point, about  $168^{\circ}$ . On exposure to light and air, terpinol is liable to become darker in colour and thicker.

Terpinol is used in soap-making and perfumery for the sake of its odour.

*Dose*.—6 to 12 centimils (1 to 2 minims).

## THEA.

### TEA.

Tea consists of the young leaves and leaf-buds of the tea shrub, *Camellia Thea*, Link. (N.O. Ternstrœmiaceæ), fermented and dried. The tea shrub is largely cultivated in China, Japan, Assam, Ceylon, and other tropical countries. The leaf-buds, together with two or sometimes three of the youngest leaves, are collected, allowed to wilt, and then rolled by hand or machinery until they acquire the twist characteristic of ordinary tea. They are then subjected to a process of fermentation, the leaves being allowed to heat ( $35^{\circ}$  to  $40^{\circ}$ ) until the colour changes to a yellowish-brown; they are then rolled again, dried, and graded by sifting. In the production of green tea the slightly wilted leaves are at once heated in a pan over an open fire; they are then rolled and fermented, during which the green colour is more or less completely retained. This difference is probably due to the destruction by heat of an oxydase (thease) which, in the case of black tea, acts upon the tannin, changing part at least of it into insoluble oxidation products, hence green tea contains more tannin than black. During the fermentation, which is common to both black and green tea, changes are induced, resulting in the production of the characteristic aroma and the destruction of a bitter principle. The nature and cause of these changes are not at present clear, but are probably due to the action of enzymes, which, together with thease, exist in the cell sap.

The leaf of the tea plant is usually broadly lanceolate, firm in texture, rather thick, and tapering to a short petiole; the upper surface is glossy, and the under, when young, is pubescent, in older leaves nearly glabrous; the serrated margin is slightly inrolled and bears characteristic, shrunken glandular teeth, which readily break off. The leaves may attain 15 centimetres in length, but those used for the production of tea seldom exceed 5 centimetres. These macroscopic characters usually suffice for the identification of even small fragments of tea-leaves, but may, if necessary, be supplemented or replaced by the microscopic characters, viz., cells of the upper epidermis, small ( $50\mu$ ); those of the lower epidermis, larger ( $70\mu$ ), wavy, and accompanied by large stomata and long thick-walled, one-

celled simple hairs bent near the base; in the mesophyll, especially of older leaves, large, elongated branching, thick-walled, sclerenchymatous idioblasts occur.

The principal constituents of tea are caffeine (1 to 5 per cent.), tannin (7 to 24 per cent.), and a trace of volatile oil; traces of theobromine and theophylline have also been detected. The percentage of caffeine usually shows little variation from an average of 4 per cent.; the commercial value of tea is, however, not determined by this factor alone, but by consideration of the size of the leaf, the presence of leaf-bud, and the taste of the infusion. The yield of ash from tea is usually from 5 to 7 per cent.

Tea is used as a source of caffeine, and the leaves are sometimes added to compounds for smoking or burning in asthma, in which condition it seems to exert a beneficial effect. The action of freshly brewed tea is that of the hot water and the contained caffeine.

## THEOBROMATIS SEMINA.

### THEOBROMA SEEDS.

*Synonym.*—Cacao Seeds.

Theobroma seeds are the product of *Theobroma Cacao*, Linn. (N.O. Sterculiaceæ), a tree cultivated in tropical America, Java, Ceylon, West Indies, etc. The fruit contains a number of seeds embedded in a scanty mucilaginous pulp. After separation from the pulp they are allowed to undergo a species of fermentation, after which they are dried. During fermentation the seeds acquire a reddish-brown colour, and the taste, at first astringent and bitter, becomes mild and oily.

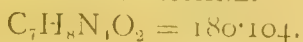
The seeds are about 2.5 centimetres in length, and flattened-ovoid in shape. Testa reddish-brown, thin, brittle, and easily separable. Kernel composed of two irregularly folded, chocolate-coloured cotyledons, readily breaking into small, angular fragments (cocoa nibs). The taste is agreeable, but oily.

The kernels contain about 2 per cent. of theobromine, and 40 to 60 per cent. of solid fat. The greater portion of the fat can be separated by pressing the heated seeds, and constitutes cacao butter or oil of theobroma; the pressed kernels ground to powder form the basis of the cocoa essences of commerce. The shells contain about 1 per cent. of theobromine, together with mucilage, etc.

Cocoa powder and theobroma paste (chocolate) prepared therefrom are used in the preparation of certain tablets and lozenges.

## THEOBROMINA.

### THEOBROMINE.



*Synonym.*—Dimethylxanthine.

Theobromine, or dimethylxanthine,  $C_5H_2(CH_3)_2N_4O_2$ , is an alkaloid contained in the seeds of *Theobroma Cacao*, Linn. (N.O. Sterculiaceæ), a native of tropical America, and cultivated there as well as in other



tropical countries such as Java, Ceylon, the West Indies, etc. It is a lower homologue of caffeine (trimethylxanthine or methyl-theobromine), and is said not to be present as theobromine in the unfermented seeds, but to develop during the process of curing by the splitting up of a glucoside, dextrose and cacao red being the other products. It may be prepared by boiling the powdered beans with water, filtering and pressing, precipitating tannins and colouring matter with lead acetate, filtering, removing lead with sulphuric acid, concentrating the solution, adding magnesia, evaporating to dryness, extracting the residue with alcohol, and purifying by recrystallisation from water; or by mixing the powdered cacao, deprived of oil, with half its weight of freshly prepared slaked lime, and boiling with 80 per cent. alcohol in a reflux condenser. On cooling the almost colourless filtrate, part of the theobromine separates as a white, crystalline powder; the remainder is obtained by distilling off the alcohol and is purified by recrystallisation.

It occurs in the form of a white crystalline powder, consisting of rhombic needles when seen under the microscope, odourless, and having a taste at first slightly bitter, but gradually becoming more so; neutral reaction. Soluble in cold water (1 in 1700), in boiling water (1 in 55), in cold alcohol (1 in 1400), in boiling alcohol (1 in 50); very difficultly soluble in ether, less difficultly in amyl alcohol; in chloroform (1 in about 100 parts boiling); scarcely soluble in benzene; insoluble in petroleum ether. It sublimes at  $290^{\circ}$  without fusion or decomposition. It combines readily with bases. Alkali and alkaline earth salts of theobromine are easily soluble in water, and from these solutions theobromine is separated as a fine, snow-white powder by the addition of acids. With acids it combines only slowly; even the mineral acid salts give up to water, and alcohol, or on warming, a part or all of the acid. The most characteristic test for theobromine, and that by which it may most readily be distinguished from and separated from caffeine is the silver test. If 1 decigram be dissolved in a mixture of 1 mil of nitric acid and 2 mils of water, the solution becomes cloudy on the addition of 10 mils of a 10 per cent. solution of silver nitrate, but clears on warming, and crystallises on cooling. If silver-theobromine, as formed in the previous test, be heated to  $100^{\circ}$  with methyl iodide, it is converted into methyl-theobromine or trimethylxanthine, which is identical with caffeine or theine. If 1 gramme of theobromine be mixed with 4 mils of water, and just enough solution of sodium hydroxide added to form a clear solution, and then shaken with 10 mils of chloroform, the latter on evaporation should not leave a residue weighing more than 5 milligrams (absence of caffeine). If bromine water be added to a solution of theobromine in hydrochloric acid, and excess of bromine driven off, the solution turns blue on the addition of a trace of ferrous sulphate in solution and a few drops of ammonia. On evaporating a mixture of theobromine and chlorine water to dryness, and then adding ammonia, a purple colour is developed. The strong mineral acids

have no colour effect on theobromine. The alkali hydrates and ammonia give precipitates soluble in excess, forming salts. Mercuric chloride precipitates it from strong solutions in crystalline form, but gives only a cloud at 1 in 3000. Potassio-mercuric iodide has no effect; tannic acid produces a cloud in dilute solutions, and so does bismuth-potassium iodide; picric acid has no effect.

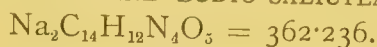
Theobromine resembles caffeine in its action (see *Caffeina*) with the difference that whilst its action upon the central nervous system is very much less than that of caffeine, its effect on muscle, the kidneys, and the heart is more pronounced. It is used principally for its diuretic effect; this is produced more certainly and to a greater extent than with caffeine, and the nervous symptoms produced by the latter, vaso-constriction, increased respiration, mental excitement, etc., are absent. It is especially useful when there is an accumulation of fluid in the body resulting from cardiac failure, in which case it is often prescribed with digitalis to relieve the dilatation of the heart. Its action seems to warrant its employment in high blood pressure, because, whilst stimulating the heart like caffeine, it dilates blood vessels like the nitrites. It is also employed in dropsy of renal or hepatic origin. In large doses it may cause nausea and loss of appetite. Theobromine is best given enclosed in a cachet or as a powder. Pills may be prepared with glycerin of tragacanth.

*Dose*.—3 to 6 decigrams (5 to 10 grains).

*NOTES*.—Theophylline—also a dimethylxanthine—has a more marked diuretic action even than theobromine, but is prone to cause digestive disturbance. A synthetic theophylline has been prepared and sold under the trade-name Theocin. A combination of sodium acetate with theobromine is known under the trade-name Agurin. It occurs as a white, deliquescent powder, soluble in water (1 in 2), and is used as a diuretic, being given in doses of 5 to 10 decigrams (8 to 13 grains) in mixtures.

## THEOBROMINÆ SODIO-SALICYLAS.

THEOBROMINE SODIO-SALICYLATE.



*Synonym*.—Sodium Theobromine Salicylate.

Theobromine sodio-salicylate,  $\text{NaC}_7\text{H}_7\text{N}_4\text{O}_2 + \text{C}_6\text{H}_4(\text{OH}, \text{COONa})$ , may be prepared by dissolving 1 of sodium hydroxide in 1 of water and adding 8 of 95 per cent. alcohol; the mixture is allowed to stand in a well-closed vessel until quite clear. The sodium hydroxide in this solution is determined, and a quantity corresponding to 40 added to 200 of water, together with 180 of theobromine, and the whole warmed until the theobromine is completely dissolved, when it is mixed with a solution of 160 of sodium salicylate in 150 of water, filtered, if necessary, and quickly evaporated to dryness. The resulting saline mass is reduced to powder and further dried in a water-oven. The compound contains 49.73 per cent. of theobromine, and 38.09 per cent. of salicylic acid, or 44.18 per cent. of sodium salicylate,

It occurs as a whitish, amorphous powder, odourless, unstable, and having a sweet, alkaline taste. Soluble in water (1 in 1), soluble in less than half its weight of hot water, the solution remaining clear on cooling; soluble in alcohol; insoluble in ether or chloroform. The 20 per cent. aqueous solution is colourless and turns red litmus paper blue, and when much diluted yields a violet colouration with ferric chloride solution; neutralised with diluted hydrochloric acid it should give a heavy, white precipitate of theobromine, and the filtrate from this with more acid should give a precipitate of salicylic acid. The precipitate of theobromine should be easily and completely soluble in solution of sodium hydroxide, and, after well washing and drying, should burn without leaving any residue. Calomel is darkened by theobromine sodio-salicylate; mercuric chloride throws down a white precipitate; tincture of iodine is first decolourised and then gives a precipitate. It precipitates alkaloids, and makes a soft mass with chloral hydrate or phenol. It is decomposed by carbon dioxide. The theobromine in the compound may be determined by dissolving 2 grammes in 10 mls of water, neutralising with diluted hydrochloric acid and then making faintly alkaline with ammonia, shaking and allowing to stand for three hours. The precipitate is collected on a tared filter, washed twice with 10 mls of cold water, dried at  $100^{\circ}$  and weighed. As 13 centigrams remain in the washings this amount is added. The precipitate should respond to the tests for theobromine. The salicylic acid is determined by shaking the filtrate, together with the washings, with ether and excess of hydrochloric acid. The ethereal solution is separated, allowed to evaporate, and the residue dried and weighed.

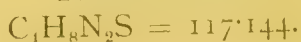
The properties of theobromine sodio-salicylate resemble those of pure theobromine. It is used as a diuretic in cardiac dropsy and chronic Bright's disease; administered with digitalis, its diuretic action is prolonged. It may be pointed out here that any diuretic involves greater work for the kidneys. Even the increased excretion of water causes the kidneys to absorb more oxygen and excrete more carbonic acid. Hence it is a doubtful problem as to how far it is good to increase the activity of the diseased kidneys. Theobromine sodio-salicylate is best given in solution in mixture form. It is incompatible with acids.

*Dose.*—6 to 12 decigrams (10 to 20 grains).

*NOTE.*—Theobromine sodio-salicylate is also known under the trade-name Diuretin.

## THIOSINAMINA.

### THIOSINAMINE.



*Synonyms.*—Allyl-thiourea; Allyl-thiocarbamide.

Thiosinamine, or allyl-thiourea,  $\text{CS}(\text{NH}_2)\text{NHC}_3\text{H}_5$ , may be prepared by mixing 2 of mustard oil with 1 of absolute alcohol, adding



7, or excess of ammonia, and heating the mixture to  $40^{\circ}$  for several hours. The odours of the oil and the ammonia disappear, and on evaporating the solution the thiosinamine crystallises. It may be dissolved in water, and purified with animal charcoal.

It occurs in the form of white, glistening, prismatic crystals, having a faint, garlic-like odour and taste, also bitter; it is sometimes odourless. Soluble in cold water (1 in 17), and more soluble in boiling water; in alcohol (1 in 2); soluble in ether. Melting-point,  $74^{\circ}$ , forming a colourless liquid. At higher temperatures it gives off white alkaline vapours, and leaves a carbonaceous residue. When heated with lead hydroxide it loses hydrogen sulphide, and becomes allyl cyanamide,  $\text{NHC}_3\text{H}_5\text{CN}$ , which afterwards polymerises into sinamine, or tri-allyl melamine  $(\text{NHC}_3\text{H}_5)_3(\text{CN})_3$ . The aqueous solution forms with mercuric salts a white precipitate; with mercurous salts, a grey precipitate; with silver nitrate, a white precipitate.

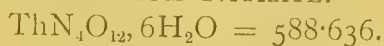
The use of thiosinamine has been advocated by Hebra, as an injection for the removal of scar-tissue. Thus, it has been employed in 10 to 15 per cent. solution in dilute glycerin to remove the fibrous tissue in lupus, uterine indurations, urethral strictures, etc., the dose being 1 to 3 mils (15 to 45 minims). Unna uses a soap and plaster in hypertrophic conditions of the skin. Its action has not been explained. Internally it has been given in capsules containing 30 to 90 milligrams ( $\frac{1}{2}$  to  $1\frac{1}{2}$  grains), with doubtful success, in rheumatic enlargements of the joints; it may also be administered, with caution, in alcoholic solution.

*Dose.*—3 to 10 centigrams ( $\frac{1}{2}$  to  $1\frac{1}{2}$  grains).

*NOTE.*—Thiosinamine is also known under the trade-name Rhodallin.

## THORII NITRAS.

THORIUM NITRATE.



Thorium nitrate,  $\text{Th}(\text{NO}_3)_4, 6\text{H}_2\text{O}$ , crystallises according to the temperature with various amounts of water. It may be prepared by dissolving precipitated thorium hydroxide in nitric acid. When the solution is evaporated and allowed to crystallise in a warm place the salt containing six molecules of water is obtained.

It occurs in commerce in the form of white crystalline granules or lumps, which are slightly hygroscopic. Very easily soluble in water and in alcohol. On calcination it yields a very voluminous and perfectly white oxide, which should amount to about 48 to 50 per cent. of the original nitrate. The aqueous solution dries over sulphuric acid to a crystalline mass. An aqueous solution of the salt should give a white precipitate with ammonium carbonate, the precipitate being completely soluble in excess of the reagent. The aqueous solution gives with caustic alkalis a voluminous precipitate of the hydroxide, insoluble in excess of the precipitant. The

presence of tartaric acid prevents the precipitation. The hydroxide precipitated in the cold by ammonia is always mixed with basic salt. Potassium ferrocyanide produces an amorphous precipitate.

Thorium salts have been recommended for local application in malignant disease, and thorium "emanation" is inhaled in phthisis. For the latter purpose a solution of thorium nitrate (1 in 5) is neutralised with ammonia, and allowed to stand in a bottle four-fifths full; the "emanation" that accumulates in the vessel is inhaled. There is no reliable evidence on the action of thorium salts.

NOTE.—Thorium nitrate is largely used in the manufacture of incandescent gas mantles.

### THUS AMERICANUM.

AMERICAN FRANKINCENSE.

*Synonym.*—Gum Thus.

American frankincense is a concrete oleoresin scraped from the trunks of *Pinus palustris*, Miller (N.O. Coniferæ), and *P. Tæda*, Linn. When, during the production of turpentine, the flow of the oleoresin gradually ceases, the last portions suffer loss of volatile oil, and solidify before reaching the cavity in which the turpentine collects. This solidified oleoresin constitutes gum thus.

When fresh, the oleoresin occurs in soft, pale yellow, opaque, tough nodules, with a marked terebinthinate odour, becoming on keeping darker, harder, and more translucent. It consists of varying quantities of oil of turpentine, together with the resin acids peculiar to colophony.

The oleoresin is used in the preparation of plasters (e.g., Emplastrum Picis), and has properties resembling those of resin.

### THYMEÆ GLANDULÆ.

THYMUS GLANDS.

Thymus glands are obtained from healthy calves, *Bos taurus*, Linn. (Order Ungulata). The thymus is a temporary organ, which attains its greatest size soon after the birth of the calf, and gradually diminishes after the second year of the animal's life.

The gland occurs as a long, narrow, reddish or greyish, lobulated body. It is situated in front of the chest, behind the sternum and partly in the lower portion of the neck, surrounded by a fibrous capsule, which sends in processes that form divisions of the gland into lobes and lobules, the latter being further subdivided into follicles by fine connective tissues.

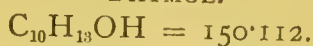
The thymus consists of lymphoid tissue, the chief constituent of its cells is proteid, especially nucleo-proteid. Various substances may be extracted from the gland, including the nitrogenous bases adenine, guanine, hypoxanthine, leucine, and xanthine, the percentage of adenine—a base derived from nuclein—being as high

as 0.179 in the fresh tissue, and 1.919 in the dry tissue. The reaction of the gland is alkaline during life, but rapidly becomes acid after death, owing to the formation of sarcolactic acid.

The functions of the thymus gland are as yet unknown, and hence all statements as to the function of the internal secretion of the gland, as shown by injecting an emulsion, are pure speculation. An injection into the veins, however, alters the coagulability of the blood in virtue of its nucleo-albumen. It has been recommended in disorders of nutrition in childhood, such as rickets, also in hæmophilia and exophthalmic goitre. It is used as *Extractum Thymi Liquidum*; or the dry gland substance may be given enclosed in a cachet (see *Thymus Siccus*).

### THYMOL.

THYMOL.



*Synonyms.*—Isopropyl-metacresol; Thyme Camphor.

Thymol, or isopropyl-metacresol,  $\text{C}_6\text{H}_3\text{CH}_3\text{OHC}_3\text{H}_7$ , is a crystalline phenol, obtained from the volatile oils of *Thymus vulgaris*, Linn. (N.O. Labiatae), *Monarda punctata*, Linn. (N.O. Labiatae), *Carum copticum*, Benth. and Hook. f. (N.O. Umbelliferae), and other plants. It may be isolated by distilling off the hydrocarbons present, then adding to the residue a solution of sodium hydroxide, with which the phenol combines to form a soluble phenate (thymol sodium),  $\text{NaC}_6\text{H}_3\text{CH}_3\text{C}_3\text{H}_7\text{O}$ . The solution is allowed to clear, hydrochloric acid added to the clear liquid to liberate the thymol, which collects as an oily layer, and crystallisation induced in this after separation and cooling by the addition of a crystal of thymol. If the separated thymol is coloured, it may be treated with animal charcoal, and recrystallised from diluted alcohol. The oils from the plants mentioned above yield in the order given approximately 20 to 30 per cent., 60 per cent., and 45 to 55 per cent. of thymol. Thymol sometimes crystallises from old oils on cooling, but the method described ensures complete separation.

It occurs in the form of large, colourless, transparent, rhombic prisms, having the characteristic, agreeable odour of thyme, and a spicy, burning, aromatic taste; it is not affected by light. Soluble in water (1 in 1500), in alcohol (8 in 3), in ether (8 in 3), in chloroform (8 in 5), in glycerin (1 in 190), in petroleum spirit (1 in 6), in turpentine oil (1 in 3), in glacial acetic acid (4 in 3), in solution of potassium hydroxide (1 in 6), in benzol, carbon bisulphide, fixed and volatile oils. The alcoholic solution is optically inactive, and should not be coloured by solution of ferric chloride. The aqueous solution becomes turbid on the addition of bromine water, but no crystalline precipitate is formed (phenol gives well-crystallised tribromophenol). Melting-point,  $44^\circ$  to  $51^\circ$ ; boiling-point,  $232^\circ$ ; specific gravity, 1.028. The crystals sink in water at ordinary temperatures, but on heating the water containing them to their melting-point the thymol rises to the



surface where it floats, the reason being that thymol expands considerably more than water on heating. At the temperature of a water-bath thymol volatilises completely (absence of paraffin, spermaceti, etc.); at ordinary temperatures it volatilises slowly. On distillation with phosphorus pentasulphide it yields cymene. When rubbed with an equal weight of menthol, camphor, or phenol, liquefaction takes place. When a solution of thymol in half its bulk of glacial acetic acid is warmed with an equal volume of sulphuric acid a reddish-violet colour is produced. If a small crystal be dissolved in 1 mil of glacial acetic acid, the solution will assume a deep bluish-green colour on adding 3 decimils of sulphuric acid and  $\frac{1}{2}$  decimil of nitric acid. On heating 1 gramme of thymol with 5 mils of a 10 per cent. solution of sodium hydroxide in a test-tube placed in a water-bath, a clear, colourless, or very slightly reddish solution is formed; the solution becomes darker on standing, and, on adding a few drops of chloroform and shaking, a violet colouration is produced, but there should be no separation of oily drops (absence of *lævo*-pinene). On heating a small quantity (about 1 centigram) of thymol with 1 centigram of potassium hydroxide and 1 mil of chloroform, a beautiful, purple-red colour is produced. The isomer carvacrol also gives this reaction, which appears to be characteristic of these two bodies. When a warm, weakly acid solution of mercuric nitrate is poured into an alcoholic solution of thymol, the mixture on cooling yields a magma of soft, felted needles of the double salt of mercury and thymol, which is colourless and odourless, but gradually becomes reddish and acquires a faint, thymol odour. A method for the determination of thymol is based upon the fact that, in alkaline solution, it combines with iodine, forming a red insoluble compound, and that the excess of iodine can be titrated back by means of standard thiosulphate after the solution has been acidified. Each molecule of thymol requires four atoms of iodine for precipitation.

Thymol resembles carbolic acid in its action, but owing to its insolubility in the fluids of the body it is absorbed much more slowly. It is also less irritant to wounds, while its germicidal action is greater, though less than naphthol. In spirituous solution it penetrates the skin and produces a local anæsthesia. In large doses it may cause symptoms of collapse and renal irritation, if time be allowed for absorption. It is used as an antiseptic lotion and mouth wash (1 in 1000), or as *Liquor Thymolis Compositus*; as a paint in ringworm (1 in 10 of alcohol, or alcohol and ether); and as an ointment (1 in 24 of soft paraffin, the thymol being dissolved by the aid of heat) in eczema, psoriasis, broken chilblains, parasitic skin affections, and burns. An ointment half this strength, perfumed with oil of lavender, is used to keep off gnats and mosquitoes. Thymol in oily solution (1 or 2 per cent.) is applied to the respiratory passages by means of a spray in nasal catarrh. A spirituous solution may be inhaled from hot water or from a dry inhaler in laryngitis and bronchial affections. It is given internally in large

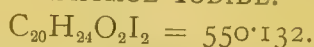
doses, 2 grammes (30 grains) or more, to expel intestinal parasites, especially the miner's worm, *Ankylostomum duodenale*. For its action as a vermifuge it should be given in a cachet or capsule; alcohol or other solvent of thymol should be avoided, and a purgative dose of castor oil administered a few hours subsequently. Thymol is used to medicate absorbent gauze and wool for use as surgical dressings.

*Dose*.—3 to 12 centigrams ( $\frac{1}{4}$  to 2 grains).

*NOTES*.—Thymol can be prepared artificially from nitrocumic aldehyde, menthone, or paracymene. Volckmann's solution of thymol is prepared by dissolving 1 of thymol in 20 each of alcohol and glycerin, and subsequently adding sufficient water to produce 1000; it is used as an antiseptic lotion, as a spray solution, and as an application to burns.

### THYMOLIS IODIDUM.

THYMOL IODIDE.



*Synonym*.—Dithymol-diiodide.

Thymol iodide, or dithymol-diiodide,  $(\text{C}_6\text{H}_2\text{CH}_3\text{C}_3\text{H}_7\text{OI})_2$ , may be prepared by dissolving 60 of finely powdered iodine and 80 of potassium iodide in a small quantity of water, diluting the solution to 300, and adding it, with constant stirring, to a solution of 16 of sodium hydroxide and 15 of thymol in 300 of water. The resulting precipitate is washed with water or until no longer alkaline, dried in the dark at 40° to 50°, and kept in amber-coloured bottles protected from the light. It contains 46.13 per cent. of iodine.

It occurs as a reddish-brown, or brick-red, bulky, amorphous powder, having a very slight aromatic odour; almost tasteless; altered by light. Insoluble in water, alcohol, glycerin, solution of sodium hydroxide, hot or cold; soluble in ether (1 in 10, leaving a slight residue); in chloroform (1 in 10); in liquid paraffin (about 1 in 50); in carbon bisulphide, collodion, soft paraffin, fixed and volatile oils. Solutions should be made without the aid of heat, and kept in amber-coloured glass bottles, protected from the action of light. On heating it is decomposed with evolution of iodine vapours, and on ignition should leave not more than 3 per cent. of residue (limit of inorganic impurities). Heated with concentrated sulphuric acid it is decomposed with separation of iodine. On shaking 0.5 gramme with 10 mls of water for a short time and filtering, the filtrate should not colour red litmus paper blue (absence of alkalies), nor produce a blue colour with a solution of starch (absence of free iodine), nor on addition of dilute nitric acid should it produce more than a slight opalescence with solution of silver nitrate (absence of iodides).

Thymol iodide possesses weak local antiseptic properties, and is used erroneously as an iodoform substitute. It has the advantage of being practically odourless, but it does not liberate iodine in the tissues, and cannot therefore replace iodoform in surgery;

moreover, on account of its extreme insolubility even in the alkaline fluids of the body, the thymol group is less active in this combination than in the free state. It passes through the body unchanged and unabsorbed. It is used as a dusting powder for burns and wounds, either in the pure state or mixed with 1 to 3 parts of talc. As an ointment (2 to 10 per cent. prepared with soft paraffin or hydrous wool fat) it is applied to the skin in eczema, psoriasis, etc.; a 10 per cent. cream is applied to the urethra in venereal disease, and a 3 per cent. ointment made with soft paraffin to the nasal mucous membrane in ozæna.

NOTES.—Thymol iodide is also known under the trade-names Aristol and Thymotal. Commercial samples of thymol iodide vary in composition, owing to differences in methods of preparation. An allied product is carvacrol iodide made in the same way, but substituting the isomer carvacrol for thymol.

### THYMUS SICCUS.

#### DRY THYMUS.

*Synonym.*—Thymus Powder.

Dry thymus is prepared from the fresh thymus gland of the healthy calf, by removing all fat, cleaning the tissue, drying and powdering.

It occurs as a yellowish-amorphous powder with a slight, characteristic odour. Partially soluble in water. The powder represents approximately eight times its weight of the fresh thymus, and should not yield more than about 7 per cent. of ash on incineration.

Dry thymus has the properties of thymus gland (see *Thymi Glandulæ*), and is used for administration in cachets, capsules, or tablets.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

### THYROIDEÆ GLANDULÆ.

#### THYROID GLANDS.

Thyroid glands are obtained from healthy sheep, *Ovis aries*, Linn. (Order Ungulata). The thyroid gland is situated in the neck, and is a highly vascular organ, consisting of two lobes which lie closely applied to the trachea, one on each side, and are easily distinguished from the surrounding tissues by their dark red colour. For medicinal purposes the glands should be taken from newly killed animals.

Each lobe is of a broad almond-shape, and dark red colour. It consists of a number of rounded or irregular sacs (thyroid vesicles), filled with a transparent, colloid material, and accompanied by lymphatics, supported by fibrous processes, the whole being enclosed in a capsule of dense areolar tissue. For medicinal use they should be freed from all external fat and connective tissue, and such as appear hypertrophied or as are seen to contain cysts when cut across should be rejected.

Little is known concerning the active constituent of the thyroid gland, but its activity has been attributed to thyreoglobulin, the iodo-



albuminous material contained in the colloid substance of the thyroid vesicles. This substance is soluble in water and in diluted glycerin, and is precipitated with calcium phosphate by the addition of phosphoric acid followed by lime water. It may also be prepared by extracting the glands with 5 per cent. sodium chloride solution and precipitating with ammonium sulphate. Thyreoglobulin contains about 1.6 per cent. of iodine, but no phosphorus. On long-continued boiling with 10 per cent. sulphuric acid, thyreoglobulin yields a substance which, when purified, contains from 9 to 14 per cent. of iodine, and has been called iodothylin. The characteristic iodine-containing group is therefore resistant to heat, which separates proteid matter. The best results of thyroid treatment are, however, obtained with preparations representing the whole gland either in glycerin solution or in powder prepared as directed under *Thyroideum Siccum*. Their activity is not destroyed by the gastric juice, and hypodermic administration of solutions has therefore been superseded by the use of thyroid orally.

The natural function of the thyroid gland is still very obscure, but its secretion plays an important part in metabolism, as shown by the grave constitutional disturbance following its atrophy or removal. The gland substance or its preparations is administered medicinally when there is reason to suspect a deficiency of natural secretion, especially in myxœdema, cretinism, and simple goitre. In Graves' disease or exophthalmic goitre the symptoms are aggravated by the use of thyroid, and there is now little doubt that this condition is one of hypersecretion of the glands (see *Serum Antithyroideum*). Thyroid increases metabolism, augmenting the excretion of nitrogen, sulphur, and phosphorus, and increasing gaseous exchange. There is loss of weight due to tissue waste, and especially to the augmented consumption of fat; the proteid breakdown is, however, also above the normal. Thyroid substance has therefore been much used as an antifat, its action is, however, very irregular, and it may give rise to symptoms of thyroidism, characterised by headache, rapid pulse often associated with palpitation, loss of appetite, nausea, and diarrhœa; they occur in myxœdematous patients more often than in others. Thyroid has proved of benefit in some skin diseases, notably psoriasis. For its action in increasing metabolism it has been recommended in the cachexia of malignant disease, and has proved of service in puerperal eclampsia; it is also employed in some forms of mental disease. In recent years it has been suggested that the arterio-sclerosis of senility may be caused or aggravated by deficient thyroid secretion; and the exhibition of the gland is reported to have had good effects in some cases. Thyroid glands are employed as *Liquor Thyroidei*, *Extractum Thyroidei Liquidum*, and as *Thyroideum Siccum*. The glands themselves were formerly administered, but the preparations are equally efficient and less nauseating. The liquid preparations should be diluted with a mixture of glycerin and chloroform water (1 to 2), as, except in the concentrated form, they are prone to decomposition.

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### THYROIDEUM SICCUM.

DRY THYROID.

*Synonym.*—Thyroid Powder.

Dry thyroid may be prepared by finely mincing or pounding the fresh thyroid glands of healthy sheep, after removing all external fat and connective tissue, and drying the glands as quickly as possible in a current of warm air; the mass is then spread in a thin layer to dry, at a temperature not exceeding  $38^{\circ}$ , preferably in a vacuum. When sufficiently dry it is coarsely powdered and freed from fat by treatment with petroleum ether. Finally the powder is completely dried by spreading it in a thin layer and leaving it in a desiccator for a few days.

The dry thyroid occurs as a light, dull-brown, amorphous powder, having a faint, meat-like odour and taste free from any flavour of putrescence; somewhat hygroscopic and liable to deterioration on exposure to air. Partly soluble in water. On incineration it should leave not more than 6 per cent. of ash. One part of the dried substance equals approximately 5 parts of the fresh thyroid. Iodine may be detected by mixing 1 gramme of dry thyroid with a mixture of 1 gramme of sodium carbonate and 3 grammes of potassium nitrate, fusing, allowing to cool, dissolving in a sufficient quantity of water, and transferring to a separator. To the solution is added diluted sulphuric acid until the liquid is just acid to litmus paper, then 5 centimils of fuming nitric acid or 1 decigram sodium nitrate, 5 to 10 centimils of concentrated sulphuric acid and about 3 mls of chloroform. On shaking the mixture and allowing to separate, the chloroform should have acquired a violet tint, due to the iodine extracted from the mass.

Dry thyroid should be prepared from the fresh and healthy glands taken from the sheep immediately after killing. It may be given in tablets or powders. The powder found in commerce is not usually free from fat. Dry thyroid has all the properties of the fresh gland (see *Thyroideæ Glandulæ*). It is administered in powders, cachets, capsules, or tablets.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

### TINCTURA ACONITI.

TINCTURE OF ACONITE.

Aconite Root, in No. 40 powder	...	...	5.00
Alcohol (70 per cent.), sufficient to produce	...	...	100.00

Add 2.5 of the alcohol to the drug to moisten it, set the moistened powder aside in a closed vessel for twenty-four hours, then pack in a percolator, and percolate with more of the menstruum until the product measures 75, or the drug is exhausted; then submit the marc to pressure, filter the expressed liquid, add the filtrate to the percolate, and make up to the required volume by the addition of more of the menstruum.

Tincture of aconite is given internally in small doses frequently repeated; mixed with strong solution of iodine, it is applied to the gums to relieve dental periostitis. Its action is that of the aconitine present.

*Dose*.—3 to 10 decimils (5 to 15 minims); if very frequently repeated, 1 to 3 decimils (2 to 5 minims).

*NOTE*.—Tinctura Aconiti, U.S.P., is prepared by extracting 10 of aconite with sufficient 66 per cent. alcohol to produce 100, and contains 0.045 per cent. w/v of aconitine; average dose, 6 decimils (10 minims).

### TINCTURA ACONITI FORTIS.

STRONG TINCTURE OF ACONITE.

*Synonym*.—Fleming's Tincture of Aconite.

Aconite Root, in No. 40 powder ... 70.00

Alcohol (70 per cent.), sufficient to produce ... 100.00

*sufficient* Add ~~25~~ of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

This preparation is used as a local anodyne for the gums, usually mixed with strong solution of iodine.

*NOTE*.—Turnbull's tincture of aconite was a similar preparation, prepared by macerating 15 of aconite root with 40 of rectified spirit.

### TINCTURA ADHATODÆ.

TINCTURE OF ADHATODA.

Adhatoda, dried, and in No. 40 powder ... 12.50

Alcohol (60 per cent.), sufficient to produce ... 100.00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctum Aconiti.

Tincture of adhatoda is official in India and the Eastern Colonies for use as an expectorant.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA ALOES.

TINCTURE OF ALOES.

Extract of Barbados Aloes ... 2.50

Liquid Extract of Liquorice ... 15.00

Alcohol (45 per cent.), sufficient to produce ... 100.00

Macerate the extract of aloes with 80 of the alcohol for forty-eight hours, with occasional agitation to facilitate solution; then add the extract of liquorice, filter, and pass sufficient of the alcohol through the filter to make up the required volume.

*Dose*.—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm), for repeated administration; for a single administration, 6 to 8 mls ( $1\frac{1}{2}$  to 2 fluid drachms).

*NOTE*.—Tinctura Aloes, U.S.P., is prepared by macerating 10 of purified aloes and 20 of liquorice root with sufficient 49 per cent. alcohol to produce 100; average dose, 2 mls (30 minims).



**TINCTURA ALOES COMPOSITA.**

COMPOUND TINCTURE OF ALOES.

*Synonym.*—Elixir ad Longam Vitam.

Barbados Aloes, crushed	...	...	...	3'00
Gentian, cut small and well bruised	...	...	...	0'50
Rhubarb, in No. 20 powder	...	...	...	0'50
Zedoary, in No. 20 powder	...	...	...	0'50
Saffron	...	...	...	0'50
Alcohol (70 per cent.)	...	...	...	100'00

Macerate the drugs in the alcohol for seven days, with frequent agitation; then strain, press the marc, mix the expressed and strained liquids, and filter if necessary.

Compound tincture of aloes is used as a bitter and purgative in atonic dyspepsia with constipation.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**TINCTURA ALOES ET MYRRHÆ.**

TINCTURE OF ALOES AND MYRRH.

*Synonym.*—Elixir Proprietatis.

Socotrine Aloes, in powder	...	...	...	10'00
Saffron	...	...	...	5'00
Tincture of Myrrh	...	...	...	100'00

Macerate for seven days, with frequent agitation, and strain.

This preparation is used as a purgative and emmenagogue.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

*NOTE.*—Tinctura Aloes et Myrrhæ, U.S.P., is prepared by macerating 10 each of purified aloes, myrrh, and liquorice root, with sufficient 71 per cent. alcohol to produce 100; average dose, 2 mils (30 minims).

**TINCTURA ALSTONIÆ.**

TINCTURE OF ALSTONIA.

Alstonia, in No. 20 powder	...	...	...	12'50
Alcohol (60 per cent.)	...	...	...	100'00

Macerate the drug in the alcohol for seven days, with frequent agitation; then strain, press the marc, mix the expressed and strained liquids, and filter if necessary.

Tincture of alstonia is official in India and the Australasian and Eastern Colonies. It is used chiefly as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA AMMONIÆ COMPOSITA.**

COMPOUND TINCTURE OF AMMONIA.

*Synonym.*—Eau de Luce.

Mastic	...	...	...	...	1'25
Alcohol	...	...	...	...	5'50
Oil of Lavender	...	...	...	...	0'15
Strong Solution of Ammonia, sufficient to produce	...	...	...	...	100'00

Dissolve the mastic in the alcohol and strong solution of ammonia; then filter if necessary, and add the oil of lavender.

This preparation is used as a stimulant and antispasmodic; externally it is applied to insect bites, and in hot countries to the bites of venomous reptiles.

*Dose.*—3 to 6 decimils (5 to 10 minims), in water.

### TINCTURA ANDROGRAPHIDIS.

#### TINCTURE OF ANDROGRAPHIS.

Andrographis, in No. 40 powder ... .. 10·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of andrographis is official in India and the Eastern Colonies, where it is used as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA ANTIPERIODICA.

#### ANTIPERIODIC TINCTURE.

*Synonym.*—Warburg's Tincture.

Socotrine Aloes, crushed	...	...	...	3·00
Rhubarb, bruised	...	...	...	1·00
Angelica Fruit, bruised	...	...	...	1·00
Elecampane Root, bruised	...	...	...	0·50
Saffron	...	...	...	0·50
Fennel, bruised	...	...	...	0·50
Prepared Chalk	...	...	...	0·50
Gentian, bruised	...	...	...	0·25
Zedoary Root, bruised	...	...	...	0·25
Cubebs, bruised	...	...	...	0·25
Myrrh, picked and bruised	...	...	...	0·25
White Agaric, in powder	...	...	...	0·25
Opium, in powder	...	...	...	0·03 -
Black Pepper, bruised	...	...	...	0·05 -
Cinnamon, bruised	...	...	...	0·10
Ginger, bruised	...	...	...	0·10
Quinine Sulphate	...	...	...	2·00 -
Camphor	...	...	...	0·25
Alcohol (60 per cent.), sufficient to produce	...	...	...	100·00

Macerate all the ingredients, except the quinine sulphate and the camphor, in 100 of the alcohol for seven days; then press, filter, dissolve the quinine sulphate and the camphor in the filtrate, set aside for three days, again filter, and add sufficient of the alcohol to make up the required volume.

Antiperiodic tincture is said to be of great value in ague and malarial fevers. In acute cases the full dose is given and repeated

in three hours, food being abstained from between the two doses, except for brandy or beef tea if required.

*Dose.*—4 to 15 mils (1 to 4 fluid drachms).

### TINCTURA ANTISEPTICA.

#### ANTISEPTIC TINCTURE.

Boric Acid	...	...	...	...	2'00
Benzoic Acid	...	...	...	...	0'10
Thymol	...	...	...	...	0'10
Eucalyptol	...	...	...	...	0'025
Oil of Peppermint	...	...	...	...	0'05
Oil of Wintergreen	...	...	...	...	0'025
Oil of Thyme	...	...	...	...	0'01
Alcohol, sufficient to produce	...	...	...	...	100'00

Dissolve the acids in 90 of the alcohol, then add the remaining ingredients, shake thoroughly, make up the required volume by the addition of more alcohol, and filter.

A few drops of this tincture in a wineglass of water forms an excellent antiseptic mouth wash and gargle.

### TINCTURA APOCYNI.

#### TINCTURE OF APOCYNUM.

*Synonym.*—Tincture of Canadian Hemp.

Apocynum, in No. 40 powder	...	...	...	10'00
Alcohol (60 per cent.)	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of apocynum is used as a tonic and diuretic in cardiac dropsy. It is much more irritant than the other cardiac tonics.

*Dose.*—3 to 6 decimils (5 to 10 minims).

### TINCTURA ARISTOLOCHIÆ.

#### TINCTURE OF ARISTOLOCHIA.

Aristolochia, in No. 40 powder	...	...	...	20'00
Alcohol (70 per cent.), sufficient to produce	...	...	...	100'00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of aristolochia is official for use in India and the Eastern Colonies as an aromatic bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA ARNICÆ.

#### TINCTURE OF ARNICA.

Arnica Rhizome, in No. 40 powder	...	...	...	5'00
Alcohol (70 per cent.), sufficient to produce	...	...	...	100'00

Add 5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.



Tincture of arnica is rarely given internally. Mixed with 30 to 40 parts of water this tincture is applied to chilblains, bruises, and sprains when the skin is unbroken.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—Tinctura Arnicae, U.S.P., is prepared by macerating 20 of arnica flowers with sufficient 49 per cent. alcohol to produce 100; average dose, 1 mil (15 minims).

### TINCTURA ARNICÆ FLORUM.

TINCTURE OF ARNICA FLOWERS.

Arnica Flowers, in No. 20 powder ... .. 10·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of arnica flowers is official for use in the North American Colonies.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA ASAFETIDÆ

TINCTURE OF ASAFETIDA.

Asafetida, bruised ... .. 20·00

Alcohol (70 per cent.), sufficient to produce ... 100·00

Macerate the asafetida with 75 of the alcohol for seven days, shaking occasionally; then filter, and pass sufficient of the alcohol through the filter to make up the required volume.

Tincture of asafetida is used in hysterical disorders on account of its unpleasant smell and taste. It is carminative and expectorant. When mixed with water, the addition of mucilage of acacia is necessary, to the extent of one-eighth of the bulk of mixture.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—Tinctura Asafetidae, U.S.P., is prepared by macerating 20 of asafetida with sufficient 95 per cent. alcohol to produce 100; average dose, 1 mil (15 minims).

### TINCTURA AURANTII.

TINCTURE OF ORANGE.

*Synonyms.*—Tinctura Aurantii Amari; Tincture of Bitter Orange Peel.

Fresh Bitter Orange Peel, cut small... .. 25·00

Alcohol ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of orange is used as a bitter and as a flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTES.—Tinctura Aurantii, B.P. 1885, was prepared by macerating 2 of dried bitter orange peel, cut small and bruised in sufficient proof spirit to produce

20 by volume. Tinctura Aurantii Amari, U.S.P., is prepared by extracting 20 of dried bitter orange peel with sufficient 57 per cent. alcohol to produce 100; average dose, 4 mils (1 fluid drachm).

### TINCTURA AURANTII DULCIS.

TINCTURE OF SWEET ORANGE.

*Synonym.*—Tincture of Sweet Orange Peel.

Fresh Sweet Orange Peel, in thin shavings,  
and cut into narrow shreds ... .. 50·00  
Alcohol, sufficient to produce ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of sweet orange is used as a flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds to Tinctura Aurantii Dulcis, U.S.P.

### TINCTURA AZADIRACHTÆ INDICÆ.

TINCTURE OF INDIAN AZADIRACH.

Indian Azadirach, rasped ... .. 10·00  
Alcohol (45 per cent.) ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of Indian azadirach is official in India and the Eastern Colonies, where it is used as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA BELLADONNÆ.

TINCTURE OF BELLADONNA.

Liquid Extract of Belladonna... .. 6·25  
Alcohol (60 per cent.), sufficient to produce ... 100·00

Add the alcohol to the liquid extract, set the mixture aside for twenty-four hours, and filter. The product should be yellow, not brown. It contains about 0·05 per cent. of total alkaloid. In action it resembles, but is generally inferior to, Liquor Atropinæ Sulphatis.

*Dose.*—3 to 10 decimils (5 to 15 minims). Larger doses are sometimes given.

*NOTES.*—Tinctura Belladonnæ, B.P. 1885, was prepared from belladonna leaves, by macero-percolation with proof spirit, 100 of the finished tincture being obtained from 5 of the leaves; dose, 3 to 12 decimils (5 to 20 minims). Tinctura Belladonnæ Foliorum, U.S.P., is prepared by extracting 10 of belladonna leaves with sufficient 49 per cent. alcohol to produce 100, and contains 0·035 per cent. w/v of alkaloids; average dose, 5 decimils (8 minims).

**TINCTURA BENZOINI.**

## TINCTURE OF BENZOIN.

*Synonym.*—Simple Tincture of Benzoin.

Benzoin, in powder	...	...	...	10'00
Alcohol, sufficient to produce	...	...	...	100'00

Macerate the benzoin in 80 of the alcohol for one hour, with frequent agitation; then filter, and add sufficient alcohol to make up the required volume.

A cosmetic lotion is made by mixing simple tincture of benzoin with 40 parts of rose water (see *Lotio Benzoini*).

When mixed with water the resinous constituents of this tincture are precipitated; in the absence of salts, the precipitate is fairly diffusible and a suspending agent need not be added if the amount of tincture be small (1 in 40). If a larger quantity of tincture is present or the lotion contains salts, mucilage of acacia must be added, amounting to about one-sixteenth of the bulk of lotion. As the presence of mucilage of acacia in lotions is objectionable it should be used as sparingly as possible.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Benzoini, U.S.P., is prepared by extracting 20 of benzoin with sufficient 95 per cent. alcohol to produce 100; average dose, 1 mil (15 minims).

**TINCTURA BENZOINI COMPOSITA.**

## COMPOUND TINCTURE OF BENZOIN.

*Synonym.*—Friars' Balsam.

Benzoin, in coarse powder	...	...	...	10'00
Socotrine Aloes...	...	...	...	1'83
Prepared Storax	...	...	...	7'50
Balsam of Tolu...	...	...	...	2'50
Alcohol, sufficient to produce	...	...	...	100'00

Macerate the ingredients with 80 of the alcohol for two days, with frequent agitation; then filter, and pass sufficient alcohol through the filter to make up the required volume.

The compound tincture is used as an antiseptic and styptic dressing for small cuts by applying undiluted upon lint. For the purposes of inhalation to check secretion in bronchial catarrh, add 1 or 2 drachms of the compound tincture to a pint of water at 60° (see *Vapor Benzoini*).

When mixed with water, the resinous constituents of compound tincture of benzoin are best suspended with a mixture of equal parts of mucilage of acacia and mucilage of tragacanth, the total amount of mucilage used equalling one-eighth of the bulk of mixture.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Benzoini Composita, U.S.P., is prepared by extracting 10 of benzoin, 2 of purified aloes, 8 of storax, and 4 of balsam of tolu, with sufficient 95 per cent. alcohol to produce 100; average dose, 2 mils (30 minims).



**TINCTURA BERBERIDIS.**

## TINCTURE OF BERBERIS.

Berberis, in No. 60 powder ... .. 10·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of berberis is official in India and the Eastern Colonies. It is used as a bitter, and is also slightly laxative.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA BOLDO.**

## TINCTURE OF BOLDO.

Boldo Leaves ... .. 10·00

Alcohol (60 per cent.) ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of boldo is used as a diuretic. It was formerly believed to act on the liver.

*Dose.*— $\frac{1}{3}$  to 2 $\frac{1}{2}$  mils (10 to 40 minims).

**TINCTURA BRYONIAE.**

## TINCTURE OF BRYONY.

Fresh Bryony Root, sufficient if dried to produce ... .. 10·00

Alcohol, a sufficient quantity.

Distilled Water, sufficient to produce ... 100·00

Determine the percentage of moisture in the root by drying about 6 grammes (100 grains) on a water-bath, and reckon the moisture as part of the water to form, with the alcohol, a mixture equal in strength to alcohol (60 per cent.). Then bruise the fresh root, macerate for seven days in a mixture of alcohol and water equal in strength to alcohol (60 per cent.), and proceed as in the case of Tinctura Alstoniæ.

Small doses of tincture of bryony are used to allay cough in pleurisy and phthisis. The dose of 6 decimils is sometimes exceeded; large doses are cathartic and diuretic.

*Dose.*— $\frac{1}{2}$  to 6 decimils (1 to 10 minims).

**TINCTURA BUCHU.**

## TINCTURE OF BUCHU.

Buchu Leaves, in No. 20 powder ... .. 20·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of buchu is used as a diuretic and urinary antiseptic.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA CALENDULÆ.**

## TINCTURE OF CALENDULA.

*Synonym.*—Tincture of Marigold Florets.

Calendula, dried, in No. 20 powder ... .. 20'00

Alcohol, sufficient to produce ... .. 100'00

Macerate the drug with 40 of the alcohol for twenty-four hours; then pack in a percolator, and percolate with more of the alcohol until the required volume is obtained.

This tincture is given internally in amenorrhœa, and, diluted with 10 to 20 parts of water, is used as a lotion for sprains and bruises.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTE.*—This preparation corresponds to Tinctura Calendulæ, U.S.P.

**TINCTURA CALOTROPIS.**

## TINCTURE OF CALOTROPIS.

Calotropis, in No. 40 powder ... .. 10'00

Alcohol (60 per cent.), sufficient to produce ... 100'00

Add 5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of calotropis is official in India and the Eastern Colonies for use as a diaphoretic and expectorant. Its action resembles that of ipecacuanha.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA CALUMBÆ.**

## TINCTURE OF CALUMBA.

Calumba Root, in No. 20 powder ... .. 10'00

Alcohol (60 per cent.) ... .. 100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of calumba is used as a simple bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Calumbæ, U.S.P., is prepared by extracting 20 of calumba with sufficient 57 per cent. alcohol to produce 100.

**TINCTURA CAMPHORÆ COMPOSITA.**

## COMPOUND TINCTURE OF CAMPHOR.

*Synonyms.*—Paregoric Elixir; Paregoric; Tinctura Opii Camphorata; Camphorated Tincture of Opium.

Tincture of Opium ... .. 6'09

Benzoic Acid ... .. 0'46

Camphor ... .. 0'34

Oil of Anise ... .. 0'31

Alcohol (60 per cent.), sufficient to produce ... 100'00

Add the benzoic acid, camphor, and oil to 90 of the alcohol,

dissolve, add the tincture of opium, and make up the required volume with the alcohol.

Compound tincture of camphor is used to allay cough. It is a good preparation of opium for administration to children.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES.*—This preparation contains the equivalent of about  $\frac{3}{8}$  grain of anhydrous morphine in 1 fluid drachm. Tincturæ Opii Camphorata, U.S.P., is prepared by macerating 0.4 each of powdered opium (12 per cent.), benzoic acid, camphor, and oil of anise, with 4 of glycerin and 95 of 49 per cent. alcohol, for three days with frequent agitation, then filtering and adding sufficient of the alcohol to produce 100 by volume; average dose, 8 mils (2 fluid drachms).

### TINCTURA CANNABIS INDICÆ.

#### TINCTURE OF INDIAN HEMP.

*Synonym.*—Tincture of Indian Cannabis.

Extract of Indian Hemp	...	...	...	5.00
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Alcohol, sufficient to produce	...	...	...	100.00
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Add the extract to 90 of the alcohol, dissolve, filter if necessary, and add sufficient alcohol to make up the required volume.

Mixtures containing tincture of Indian hemp require the addition of one-sixteenth, or better one-eighth, of their bulk of mucilage of acacia. The mucilage should be diluted with twice its bulk of water and the tincture—measured in a dry measure—added in successive small portions, shaking after each addition.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTES.*—This tincture should be preserved in closely-stoppered bottles and kept in a dark place. Tinctura Cannabis Indicæ, U.S.P., is prepared by extracting 10 of Indian hemp with sufficient 95 per cent. alcohol to produce 100; average dose, 6 decimils (10 minims).

### TINCTURA CANTHARIDINI.

#### TINCTURE OF CANTHARIDIN.

Cantharidin	...	...	...	...	0.01
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Chloroform	...	...	...	...	1.25
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Alcohol, sufficient to produce	...	...	...	100.00
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Dissolve the cantharidin in the chloroform, and add sufficient alcohol to make up the required volume.

This preparation has been suggested as an alternative to Tinctura Cantharidis, because it yields a product of more uniform strength.

*Dose.*—3 to 10 decimils (5 to 15 minims); if frequently repeated, 1 to 3 decimils (2 to 5 minims).

### TINCTURA CANTHARIDIS.

#### TINCTURE OF CANTHARIDES.

Cantharides, in No. 40 powder	...	...	1.25
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Alcohol	...	...	100.00
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Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.



Tincture of cantharides is sometimes given internally in cystitis, gleet, and renal hæmorrhage, but it often irritates the urinary tract, causing pain and strangury. It is used principally in hair lotions (1 in 8) as a stimulant to the scalp.

*Dose.*—3 to 10 decimils (5 to 15 minims); if frequently repeated 1 to 3 decimils (2 to 5 minims).

*NOTE.*—Tinctura Cantharidis, U.S.P., is prepared by extracting 10 of cantharides with sufficient 95 per cent. alcohol to produce 100; average dose, 3 decimils (5 minims).

### TINCTURA CAPSICI.

#### TINCTURE OF CAPSICUM.

Capsicum, in No. 20 powder	...	...	...	5'00
Alcohol (70 per cent.)	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of capsicum is used internally as a carminative in dyspepsia. It is given to alcoholics to allay the craving. For external use the stronger tincture is more suitable.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—Tinctura Capsici, U.S.P., is prepared by extracting 10 of capsicum with sufficient 90 per cent. alcohol to produce 100; average dose, 5 decimils (8 minims).

### TINCTURA CAPSICI FORTIOR.

#### STRONGER TINCTURE OF CAPSICUM.

*Synonym.*—Turnbull's Tincture of Capsicum.

Capsicum Fruit, in No. 80 powder	...	...	...	33'00
Alcohol, sufficient to produce	...	...	...	100'00

Add sufficient of the alcohol to moisten the drug, and allow to macerate for twenty-four hours in a closed vessel; then pack in a percolator, and percolate with sufficient of the alcohol to produce the required volume.

It is applied externally as a counter irritant for lumbago, rheumatism, and unbroken chilblains (see also Linimentum Capsici). It is also used to promote the growth of hair.

*Dose.*— $\frac{1}{2}$  to 2 decimils (1 to 3 minims).

### TINCTURA CARDAMOMI.

#### TINCTURE OF CARDAMOMS.

Cardamom Seeds, bruised	...	...	...	10'00
Alcohol (60 per cent.), sufficient to produce	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of cardamoms is used as a carminative in dyspepsia.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Cardamomi, U.S.P., is prepared by extracting 20 of cardamom fruit with sufficient 49 per cent. alcohol to produce 100.

**TINCTURA CARDAMOMI COMPOSITA.**

## COMPOUND TINCTURE OF CARDAMOMS.

Cardamom Seeds, bruised	...	...	...	1'25
Caraway Fruit, bruised	...	...	...	1'25
Raisins of Commerce, freed from seeds	...	...	...	10'00
Cinnamon Bark, bruised	...	...	...	2'50
Cochineal, in powder	...	...	...	0'63
Alcohol (60 per cent.)	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Compound tincture of cardamoms is used as a carminative and flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**NOTE.**—Tinctura Cardamomi Composita, U.S.P., is prepared by extracting 2'5 of cardamom fruit, 1'2 of caraway fruit, 2'5 of Saigon cinnamon, and 0'5 of cochineal with a mixture of 95 per cent. alcohol and 5 of glycerin, then adding sufficient 49 per cent. alcohol to produce 100.

**TINCTURA CARMINATIVA.**

## CARMINATIVE TINCTURE.

Cardamom Seeds, bruised	...	...	...	7'00
Stronger Tincture of Ginger	...	...	...	6'00
Oil of Caraway	...	...	...	1'00
Oil of Cinnamon	...	...	...	1'00
Oil of Clove	...	...	...	1'00
Alcohol, sufficient to produce	...	...	...	100'00

Macerate the cardamoms in 75 of alcohol for seven days; then decant, express, dissolve the oils in the mixed tinctures, and add sufficient alcohol to produce the required volume.

Carminative tincture is used as a stimulant and carminative in flatulent dyspepsia.

*Dose.*—1 to 6 decimils (2 to 10 minims).

**TINCTURA CASCARILLÆ.**

## TINCTURE OF CASCARILLA.

Cascarilla, in No. 40 powder	...	...	...	20'00
Alcohol (70 per cent.), sufficient to produce	...	...	...	100'00

Add 15 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Mixtures containing tincture of cascarrilla with a mineral acid require the addition of one-sixteenth of their bulk of mucilage of acacia, to prevent the separation of resin in blackish indiffusible masses.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA CASTOREI.**

## TINCTURE OF CASTOR.

Castor, in coarse powder	...	...	...	5.00
Alcohol	...	...	...	100.00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Mixtures containing this tincture require the addition of one-sixteenth of their bulk of mucilage of acacia. It has a decided action in augmenting cardiac output, raising blood pressure and constricting peripheral vessels.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA CATECHU.**

## TINCTURE OF CATECHU.

Catechu, in coarse powder	...	...	...	20.00
Cinnamon Bark, bruised	...	...	...	5.00
Alcohol (60 per cent.)	...	...	...	100.00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Tincture of catechu is used as an astringent in diarrhœa, and as an ingredient of astringent injections (1 in 50).

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**NOTE**.—*Tinctura Gambir* (Catechu) *Composita*, U.S.P., is prepared by macerating 5 of catechu and  $2\frac{1}{2}$  of Saigon cinnamon, with sufficient 49 per cent alcohol to produce 100; average dose, 4 mils (1 fluid drachm).

**TINCTURA CHIRATÆ.**

## TINCTURE OF CHIRETTA.

Chiretta, in No. 40 powder	...	...	...	10.00
Alcohol (60 per cent.), sufficient to produce	...	...	...	100.00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of *Tinctura Aconiti*.

Tincture of chiretta is used as a bitter.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA CHLOROFORMI COMPOSITA.**

## COMPOUND TINCTURE OF CHLOROFORM.

Chloroform	...	...	...	...	10.00
Alcohol	...	...	...	...	40.00
Compound Tincture of Cardamoms	...	...	...	...	50.00

Mix the chloroform and alcohol with the tincture.

This tincture is used as a carminative and flavouring agent.

*Dose*.— $1\frac{1}{2}$  to 4 mils (20 to 60 minims).



**TINCTURA CHLOROFORMI ET MORPHINÆ COMPOSITA.**

COMPOUND TINCTURE OF CHLOROFORM AND MORPHINE.

Chloroform	...	...	...	7·50
Morphine Hydrochloride	...	...	...	1·00
Diluted Hydrocyanic Acid	...	...	...	5·00
Tincture of Capsicum	...	...	...	2·50
Tincture of Indian Hemp	...	...	...	10·00
Oil of Peppermint	...	...	...	0·15
Glycerin	...	...	...	25·00
Alcohol, sufficient to produce	...	...	...	100·00

Add the chloroform, tincture of capsicum, tincture of Indian hemp, oil of peppermint, and glycerin, to 45 of alcohol, dissolve the morphine hydrochloride in the mixture; then add the hydrocyanic acid, and sufficient alcohol to make up the required volume.

This preparation is used as a sedative to the gastro-intestinal tract, and to relieve pain. It is also used in the treatment of diarrhœa, colic, and bronchial cough.

*Dose.*—3 to 10 decimils (5 to 15 minims).

**NOTES.**—Tinctura Chloroformi et Morphinæ Composita, B.P. 1885, contained chloroform, 12·5; ether, 3·125; rectified spirit, 12·5; morphine hydrochloride, 0·22; diluted hydrocyanic acid, 6·25; oil of peppermint, 0·1; liquid extract of liquorice, 12·5; treacle, 12·5; and syrup, sufficient to produce 100. Dose, 3 to 6 decimils (5 to 10 minims). This preparation was intended as an equivalent for chlorodyne, a better formula for which will be found under Chlorodynum.

**TINCTURA CIMICIFUGÆ.**

TINCTURE OF CIMICIFUGA.

*Synonym.*—Tincture of Actæa Racemosa.

Cimicifuga, in No. 40 powder	...	...	10·00
Alcohol (60 per cent.), sufficient to produce	...	...	100·00

Add 5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of cimicifuga is used as a bitter.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**NOTE.**—Tinctura Cimicifugæ, U.S.P., is prepared by extracting 20 of cimicifuga with sufficient 95 per cent. alcohol to produce 100.

**TINCTURA CINCHONÆ.**

TINCTURE OF CINCHONA.

Red Cinchona Bark, in No. 40 powder	...	...	20·00
Alcohol (70 per cent.), a sufficient quantity	...	...	

Add 20 of the alcohol to the drug, and allow to macerate for twenty-four hours, then transfer to a percolator; percolate with more of the alcohol until the product measures 70; press the marc, mix the liquids, and filter after allowing to stand for twenty-four hours. Standardise the product by the process described under

Extractum Cinchonæ Liquidum, and adjust the strength of the tincture so that the finished product shall contain 1 per cent. w/v of alkaloids.

Mixtures containing tincture of cinchona with alkaline carbonates, iodides, or salicylates require the addition of one-sixteenth of their bulk of mucilage of acacia to suspend the precipitated alkaloidal salts in a diffusible form. The tincture should be added to the mucilage diluted with three or four times its bulk of water, and the salts subsequently added in dilute solution. It is employed chiefly as a bitter.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Cinchonæ, U.S.P., is prepared by extracting 20 of cinchona with 7.5 of glycerin, and sufficient 70 per cent. alcohol to produce 100; it should contain 0.75 per cent. w/v of anhydrous ether-soluble alkaloids.

### TINCTURA CINCHONÆ COMPOSITA.

#### COMPOUND TINCTURE OF CINCHONA.

Dried Bitter Orange Peel, well bruised	...	5.00
Serpentary Rhizome, in No. 40 powder	...	2.50
Cochineal, in powder	... ..	0.32
Saffron	... ..	0.63
Tincture of Cinchona	... ..	50.00
Alcohol (70 per cent.), sufficient to produce	...	100.00

Macerate the orange peel, serpentary, cochineal, and saffron with 50 of the alcohol for seven days, with frequent agitation; then strain, press, mix the liquids, add the tincture of cinchona, with sufficient alcohol to make up the required volume, and filter, after allowing to stand for twenty-four hours. The product should contain from 0.45 to 0.55 per cent. w/v, of alkaloids, and 2 mls should leave on evaporation a residue which imparts a yellow colour to chloroform.

The recommendations for dispensing Tinctura Cinchonæ apply also to this tincture. It is more pleasantly aromatic than the simple tincture.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Cinchonæ Composita, U.S.P., is prepared by extracting 8 of dried bitter orange peel, 2 of serpentary rhizome, and 10 of red cinchona bark, with a mixture of 7.5 of glycerin, and sufficient 70 per cent. alcohol to produce 100.

### TINCTURA CINCHONÆ FLAVÆ.

#### TINCTURE OF YELLOW CINCHONA.

Yellow Cinchona Bark, in moderately fine powder	... ..	20.00
Alcohol (60 per cent.)	... ..	100.00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

The recommendations for dispensing *Tinctura Cinchonæ* apply also to this tincture.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

NOTE.—This preparation was official in the British Pharmacopœia, 1867.

## TINCTURA CINNAMOMI.

### TINCTURE OF CINNAMON.

Cinnamon Bark, in No. 40 powder ... .. 20·00

Alcohol (70 per cent.), sufficient to produce ... 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of *Tinctura Aconiti*.

Tincture of cinnamon is used as a carminative and flavouring agent.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—*Tinctura Cinnamomi*, U.S.P., is prepared by extracting 20 of Saigon cinnamon with 7·5 of glycerin and sufficient 70 per cent. alcohol to produce 100.

## TINCTURA CINNAMOMI COMPOSITA.

### COMPOUND TINCTURE OF CINNAMON.

Cinnamon Bark, bruised ... .. 2·50

Cardamom Seeds, bruised ... .. 1·25

Long Pepper, bruised ... .. 1·00

Ginger, bruised ... .. 1·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Compound tincture of cinnamon may be used for the same purpose as *Tinctura Cinnamomi*.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

NOTE.—This preparation corresponds to *Tinctura Cinnamomi Composita* of the London Pharmacopœia, 1851, but is made with one-sixth more long pepper and ginger.

## TINCTURA COCÆ.

### TINCTURE OF COCA.

Coca Leaves, in No. 20 powder ... .. 20·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 12·5 of the alcohol to the drug to moisten it, and proceed as in the case of *Tinctura Aconiti*.

Tincture of coca is used as a cerebral stimulant and gastric sedative.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).



**TINCTURA COCCI.**

## TINCTURE OF COCHINEAL.

Cochineal, in powder	...	...	...	10'00
Alcohol (45 per cent.)	...	...	...	100'00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Tincture of cochineal is used chiefly as a colouring agent. It is rendered more miscible by the addition of about 10 per cent. of potassium citrate.

*Dose*.—3 to 10 decimils (5 to 15 minims).

**TINCTURA COLCHICI COMPOSITA.**

## COMPOUND TINCTURE OF COLCHICUM.

Colchicum Seeds, bruised	...	...	...	12'50
Aromatic Spirit of Ammonia	...	...	...	100'00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Compound tincture of colchicum is used for the specific action of colchicum in gout.

*Dose*.—1 to 2 mils (15 to 30 minims).

NOTE.—This tincture was official in the London Pharmacopœia, 1851.

**TINCTURA COLCHICI FLORUM.**

## TINCTURE OF COLCHICUM FLOWERS.

Fresh Colchicum Flowers	...	...	...	200'00
Alcohol (70 per cent.)	...	...	...	100'00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Tincture of colchicum flowers is used for the specific action of colchicum in gout.

*Dose*.— $\frac{1}{2}$  to 2 mils (8 to 30 minims).

**TINCTURA COLCHICI SEMINUM.**

## TINCTURE OF COLCHICUM SEEDS.

Colchicum Seeds, in No. 30 powder	...	...	20'00
Alcohol (45 per cent.), sufficient to produce	...	...	100'00

Add 12·5 of the alcohol to the drug to moisten it, and proceed as in the case of *Tinctura Aconiti*.

Tincture of colchicum seeds is used for the specific action of colchicum in gout.

*Dose*.—3 to 10 decimils (5 to 15 minims).

NOTE.—*Tinctura Colchici Seminis*, U.S.P., is prepared by extracting 10 of colchicum seed with sufficient (57 per cent.) alcohol to produce 100; it should contain 0·05 per cent. w/v of colchicine; average dose, 2 mils (30 minims).

**TINCTURA COLLINSONIÆ.**

## TINCTURE OF COLLINSONIA.

Collinsonia Rhizome	...	...	...	10'00
Alcohol (60 per cent.)	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of collinsonia is used chiefly as a diuretic.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

**TINCTURA COLOCYNTHIDIS.**

## TINCTURE OF COLOCYNTH.

Colocynth Pulp, in coarse powder	...	...	10'00
Alcohol	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of colocynth is a drastic purgative and should be prescribed with carminatives to lessen the tendency to gripe.

*Dose.*— $\frac{1}{2}$  to 1 mil (8 to 15 minims).

*NOTE.*—This preparation corresponds with the Tinctura Colocynthidis of the German Pharmacopœia.

**TINCTURA CONII.**

## TINCTURE OF CONIUM.

*Synonym.*—Tincture of Hemlock.

Conium Fruit, recently reduced to No. 40 powder	...	...	20'00
Alcohol (70 per cent.), sufficient to produce	...	...	100'00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of conium is used as a sedative in spasmodic affections of the respiratory organs, but is of doubtful value. It has also been used as an inhalation to allay bronchial spasm. It is less uniform in strength than Extractum Conii Liquidum, which is standardised to contain 1 per cent. of alkaloids.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA CONVALLARIÆ.**

## TINCTURE OF CONVALLARIA.

Convallaria Flowers, in No. 20 powder	...	12'50
Alcohol (60 per cent.), sufficient to produce	...	100'00

Add sufficient of the alcohol to moisten the drug, and allow to macerate for twenty-four hours; then pack in a percolator, and percolate with sufficient of the alcohol to produce the required volume.

Tincture of convallaria is used for its action on the heart and circulation in the same manner as tincture of digitalis.

*Dose.*—3 to 12 decimils (5 to 20 minims).

**TINCTURA COSCINII.**

## TINCTURE OF COSCINIUM.

Coscinium, in No. 20 powder ... .. 10·00

Alcohol (60 per cent.) ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of coscinium is official in India and the Eastern Colonies for use as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA COTO.**

## TINCTURE OF COTO.

Coto Bark, bruised ... .. 10·00

Alcohol ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of coto is used chiefly in diarrhœa and intestinal catarrh.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims).

**TINCTURA CROCI.**

## TINCTURE OF SAFFRON.

Saffron ... .. 5·00

Alcohol (60 per cent.) ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of saffron is used chiefly as a colouring agent.

*Dose.*—3 to 10 decimils (5 to 15 minims).

**TINCTURA CUBEÆ.**

## TINCTURE OF CUBEBS.

Cubebs, in powder ... .. 20·00

Alcohol, sufficient to produce ... .. 100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Mixtures containing tincture of cubebs require the addition of one-sixteenth of their bulk of mucilage of acacia.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA CURCUMÆ.**

## TINCTURE OF TURMERIC.

Turmeric, bruised ... .. 16·66

Alcohol ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.



Tincture of turmeric is used as a test solution, being turned brown by alkalies, while the original yellow colour is restored by acids, except in the case of boric acid, which gives a reddish-brown colouration, changing to bluish-black on the addition of ammonia. Turmeric paper is prepared by soaking unglazed white paper in the tincture and then drying it.

NOTE. — Turmeric tincture, U.S.P., is prepared by digesting turmeric repeatedly with small quantities of water, discarding the liquid, drying the residue, and macerating it in six times its weight of 95 per cent. alcohol for several days, and filtering.

### TINCTURA DATURÆ SEMINUM.

#### TINCTURE OF DATURA SEEDS.

Datura Seeds, bruised ... .. 25·00

Alcohol (70 per cent.), sufficient to produce ... 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of datura seeds is official in India and the Eastern Colonies for use as a respiratory sedative and antispasmodic. The action is due to the contained atropine.

*Dose.*—3 to 10 decimils (5 to 15 minims).

### TINCTURA DIGITALIS.

#### TINCTURE OF DIGITALIS.

*Synonym.*—Tincture of Foxglove.

Digitalis Leaves, in No. 20 powder ... .. 12·50

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of digitalis is used for its action on the heart and circulation (see Digitalis Folia).

*Dose.*—3 to 10 decimils (5 to 15 minims).

NOTES. — This tincture is best made in small quantities, and should be preserved in bottles which are quite filled, until required for use; it should be recently prepared, as it deteriorates if kept for a prolonged period. Tinctura Digitalis, U.S.P., is prepared by extracting 10 of digitalis leaves with sufficient 49 per cent. alcohol to produce 100.

### TINCTURA ERGOTÆ.

#### TINCTURE OF ERGOT.

Ergot, in No. 20 powder ... .. 25·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of ergot was formerly employed for the same purposes as Extractum Ergotæ Liquidum. It has now fallen into disuse.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

NOTE. — Tinctura Ergotæ was official in the British Pharmacopœia, 1885.

**TINCTURA ERGOTÆ AMMONIATA.**

AMMONIATED TINCTURE OF ERGOT.

Ergot, in No. 20 powder	...	...	25'00
Solution of Ammonia	...	...	10'00
Alcohol (60 per cent.), sufficient to produce	...	...	100'00

Add the solution of ammonia to 90 of the alcohol, moisten the drug with 10 of the mixture, and percolate with the remainder; press the residue, mix the liquids, add sufficient alcohol to produce the required volume, and filter, after standing for twenty-four hours.

Ammoniated tincture of ergot is used in a similar way to Extractum Ergotæ Liquidum.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA ERYTHROPHLÆI.**

TINCTURE OF SASSY BARK.

*Synonym.*—Tincture of Casca.

Sassy Bark, in No. 20 powder	...	...	10'00
Alcohol, sufficient to produce	...	...	100'00

Add sufficient of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

This tincture is prescribed as a cardiac tonic.

*Dose.*—3 to 6 decimils (5 to 10 minims).

**TINCTURA EUCALYPTI.**

TINCTURE OF EUCALYPTUS.

Eucalyptus Leaves, in No. 20 powder	...	...	20'00
Alcohol (60 per cent.), sufficient to produce	...	...	100'00

Add sufficient of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of eucalyptus is given internally in asthma, phthisis, and chronic bronchitis.

*Dose.*—1 to 8 mils (15 to 120 minims).

**TINCTURA EUCALYPTI GUMMI.**

TINCTURE OF EUCALYPTUS GUM.

*Synonyms.*—Tinctura Gummi Rubri; Tincture of Red Gum.

Eucalyptus Gum, in powder	...	...	25'00
Alcohol (45 per cent.), sufficient to produce	...	...	100'00

Macerate the eucalyptus gum with 100 of the alcohol for forty-eight hours, with frequent agitation; then strain, and add sufficient of the alcohol to make up to the required volume.

Tincture of eucalyptus gum is given as an astringent in diarrhoea, and is added to gargles for inflamed throats.

*Dose.*—1 to 2½ mils (15 to 40 minims).

**TINCTURA EUONYMI.**

## TINCTURE OF EUONYMUS.

*Synonym.*—Tincture of Euonymin.

Euonymus Bark, in No. 20 powder ...	...	...	20'00
Alcohol, sufficient to produce ...	...	...	100'00

Add 15 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of euonymus is used as a purgative in chronic constipation. It has also some action on the heart, resembling that of digitalis, and increases the flow of bile.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  mils (10 to 40 minims).

**TINCTURA EUPHORBIAE.**

## TINCTURE OF EUPHORBIA.

Euphorbia, in No. 20 powder ...	...	...	20'00
Alcohol (60 per cent.), sufficient to produce ...	...	...	100'00

Add sufficient of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

This tincture is used in spasmodic asthma, coryza, and hay fever.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims).

**TINCTURA FERRI ACETATIS.**

## TINCTURE OF FERRIC ACETATE.

Strong Solution of Ferric Acetate ...	...	...	25'00
Acetic Acid ...	...	...	5'00
Alcohol ...	...	...	25'00
Distilled Water, sufficient to produce ...	...	...	100'00

Mix the solution of ferric acetate with the acid, alcohol, and distilled water.

Tincture of ferric acetate is used like other preparations of iron as a hæmatinic.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

NOTES.—Tinctura Ferri Acetatis was official in the British Pharmacopœia, 1885. It should be kept in a well-stoppered bottle.

**TINCTURA FERRI PERCHLORIDI.**

## TINCTURE OF FERRIC CHLORIDE.

*Synonym.*—Tinctura Ferri Chloridi.

Strong Solution of Ferric Chloride ...	...	...	25'00
Alcohol ...	...	...	25'00
Distilled Water, sufficient to produce ...	...	...	100'00

Add the strong solution of ferric chloride to the alcohol, and add sufficient distilled water to make up the required volume.

Tincture of perchloride of iron is incompatible with the carbonates and hydrates of the alkalies and alkaline earths, salicylic acid and



salicylates, phosphoric and hydrobromic acids, bromides and iodides, mucilage of acacia, and astringent vegetable infusions. It may be prescribed with infusion of calumba or infusion of quassia. It is used as a hæmatinic in anæmia and during convalescence, but its astringency prevents its continuation for long periods. It is given as an astringent to the intestinal tract. In erysipelas and other acute septicæmias, large doses frequently repeated are often prescribed. The taste of the tincture is best masked with glycerin.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTES.*—Tinctura Ferri Muriatis of the Edinburgh Pharmacopœia, 1841, was prepared by adding 6 of red oxide of iron to 20 of commercial muriatic acid, digesting with gentle heat and occasional agitation for a day, or till most of the oxide was dissolved, then adding 60 of rectified spirit, and filtering. It possesses no advantage over the official tincture. Tinctura Ferri Chloridi, U.S.P., is prepared by mixing 35 of solution of ferric chloride (29 per cent.) with sufficient 95 per cent. alcohol to produce 100; average dose, 5 decimils (8 minims).

### TINCTURA GALLÆ.

#### TINCTURE OF GALLS.

Galls, in No. 40 powder	...	...	...	10·00
Alcohol (60 per cent.), sufficient to produce	...	...	...	100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of galls is rarely given internally. It is used diluted with water as a lotion to arrest hæmorrhage, and as an injection in gleet and gonorrhœa.

*Dose.*—2 to 8 mils ( $\frac{1}{2}$  to 2 fluid drachms).

*NOTES.*—Tinctura Gallæ was official in the British Pharmacopœia, 1885. Tinctura Gallæ, U.S.P., is prepared by extracting 20 of nutgall with 10 of glycerin and sufficient 95 per cent. alcohol to produce 100.

### TINCTURA GELSEMI.

#### TINCTURE OF GELSEMIUM.

Gelsemium Root, in No. 40 powder	...	...	10·00
Alcohol (60 per cent.), sufficient to produce	...	...	100·00

Add 5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of gelsemium is used chiefly in the treatment of neuralgia. In some people moderate doses cause double vision.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—This preparation corresponds to Tinctura Gelsemii, U.S.P.

### TINCTURA GENTIANÆ.

#### TINCTURE OF GENTIAN.

Gentian Root, cut small, and well bruised	...	...	10·00
Alcohol (45 per cent.)	...	...	100·00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Tincture of gentian is used as a bitter.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA GENTIANÆ COMPOSITA.

#### COMPOUND TINCTURE OF GENTIAN.

Gentian Root, cut small, and well bruised	...	10'00
Dried Bitter Orange Peel, well bruised	...	3'75
Cardamom Seeds, bruised	... ..	1'25
Alcohol (45 per cent.)	... ..	100'00

Macerate for seven days, and proceed as in the case of *Tinctura Alstoniæ*.

Compound tincture of gentian is used as an aromatic bitter and flavouring agent.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—*Tinctura Gentianæ Composita*, U.S.P., is prepared by extracting 10 of gentian root, 4 of bitter orange peel, and 1 of cardamom fruits with sufficient 57 per cent. alcohol to produce 100.

### TINCTURA GOSSYPIL.

#### TINCTURE OF COTTON ROOT BARK.

Cotton Root Bark, in No. 30 powder	...	25'00
Alcohol (60 per cent.), sufficient to produce	...	100'00

Add sufficient of the alcohol to the drug to moisten it, and proceed as in the case of *Tinctura Aconiti*.

Tincture of cotton root bark has been recommended as a substitute for ergot, but is of doubtful utility.

*Dose*.—4 mils (1 fluid drachm).

### TINCTURA GUAIACI.

#### TINCTURE OF GUAIAACUM.

*Synonym*.—Tincture of Guaiac.

Guaiacum Resin, in powder	... ..	20'00
Alcohol, sufficient to produce	... ..	100'00

Macerate the guaiacum resin with 85 of alcohol for forty-eight hours with frequent agitation; then filter, and pass sufficient alcohol through the filter to make up the required volume.

Mixtures containing tincture of guaiacum require the addition of one-eighth of their bulk of mucilage of acacia to suspend the resin in a diffusible form. It is used with ozonic ether as a test for blood; a few drops of the tincture are added to the suspected liquid, followed by a few drops of ozonic ether, when the presence of blood develops a deep blue colour.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—This preparation corresponds to *Tinctura Guaiaci*, U.S.P.

**TINCTURA GUAIACI AMMONIATA.**

AMMONIATED TINCTURE OF GUAIACUM.

*Synonym.*—Ammoniated Tincture of Guaiac.

Guaiacum Resin, in powder	...	...	...	20'00
Oil of Nutmeg	...	...	...	0'31
Oil of Lemon	...	...	...	0'21
Strong Solution of Ammonia	...	...	...	7'50
Alcohol, sufficient to produce	...	...	...	100'00

Macerate the resin in the solution of ammonia and 80 of alcohol for forty-eight hours, with frequent agitation; then filter, dissolve the oils in the filtrate, and pass sufficient alcohol through the filter to make up the required volume.

Mixtures containing ammoniated tincture of guaiacum require the addition of one-eighth of their bulk of mucilage of acacia to suspend the resin in a diffusible form. The mucilage should be diluted with three or four times its bulk of water, and the tincture—measured in a dry measure—added in successive portions, shaking after each addition. Its use is empirical in chronic rheumatism, rheumatoid arthritis, and syphilis.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—Tinctura Guaiaci Ammoniata, U.S.P., is prepared by macerating 20 of guaiacum resin with sufficient aromatic spirit of ammonia to produce 100.

**TINCTURA GUARANÆ.**

TINCTURE OF GUARANA.

Guarana, in fine powder	...	...	...	25'00
Alcohol	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of guarana is given chiefly for sick-headache. It acts in virtue of its caffeine.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms) in water.

**TINCTURA HAMAMELIDIS.**

TINCTURE OF HAMAMELIS.

Hamamelis Bark, in No. 20 powder	...	...	10'00
Alcohol (45 per cent.), sufficient to produce	...	...	100'00

Add 5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of hamamelis is a useful astringent and styptic, and is applied as an astringent lotion or injection diluted with 10 or 20 parts of water, especially for hæmorrhoids. It has no action after absorption.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).



**TINCTURA HELLEBORI NIGRI.**

## TINCTURE OF BLACK HELLEBORE.

Black Hellebore Root, in No. 40 powder ... 12.50

Alcohol (60 per cent.), sufficient to produce ... 100.00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

This tincture is cathartic and emmenagogue, but is seldom employed. After absorption it exerts an action like digitalis.

*Dose.*—1 to 4 mils (15 to 60 minims).

**TINCTURA HYDRASTIS.**

## TINCTURE OF HYDRASTIS.

Hydrastis Rhizome, in No. 60 powder ... 10.00

Alcohol (60 per cent.), sufficient to produce ... 100.00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of hydrastis is used as a bitter, as an astringent, and in cartarrhal affections of the mucous membranes, especially of the uterus. For local use as a styptic it should be diluted with an equal quantity of water.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Hydrastis, U.S.P., is prepared by extracting 20 of hydrastis rhizome with sufficient 72 per cent. alcohol to produce 100; it should contain not less than 0.4 per cent. w/v of hydrastine.

**TINCTURA HYOSCYAMI.**

## TINCTURE OF HYOSCYAMUS.

*Synonym.*—Tincture of Henbane.

Hyoscyamus Leaves and Flowering Tops, in

No. 20 powder ... 10.00

Alcohol (45 per cent.), sufficient to produce ... 100.00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of hyoscyamus is used in the same way as tincture of belladonna, but is more sedative on account of the hyoscine it contains. It is employed to allay irritability of the bladder and to prevent griping by purgative medicines. It is also used in all spasmodic affections of plain muscle.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds to Tinctura Hyoscyami, U.S.P., except that the latter is prepared with 49 per cent. alcohol.

**TINCTURA IGNATIÆ AMARÆ.**

## TINCTURE OF IGNATIA.

Ignatia Seeds, in fine powder ... 10.00

Alcohol, sufficient to produce ... 100.00

Add sufficient alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of ignatia is used as a bitter and tonic in place of tincture of nux vomica.

*Dose.*—3 to 12 decimils (5 to 20 minims).

### TINCTURA IODI.

#### TINCTURE OF IODINE.

Iodine	...	...	...	...	...	2'50
Potassium Iodide	...	...	...	...	...	2'50
Distilled Water	...	...	...	...	...	2'50
Alcohol, sufficient to produce	...	...	...	...	...	100'00

Dissolve the potassium iodide and iodine in the distilled water, and add sufficient alcohol to make up the required volume.

Tincture of iodine is sometimes given internally in small doses to check vomiting. Its chief use is as a counter-irritant (see Iodum). It temporarily stains the skin yellowish-brown, and the colour may be removed by solution of ammonia or sodium thiosulphate. The tincture is sometimes added to hot water for an inhalation (see Vapor Iodi).

*Dose.*—1 to 3 decimils (2 to 5 minims).

NOTES.—Tinctura Iodinei, formerly official in the Edinburgh Pharmacopœia, contains about 6·5 per cent. of iodine dissolved in alcohol, and is intended for external application only; it is not miscible with water. Tinctura Iodi, U.S.P., is prepared by dissolving 7 of iodine and 5 of potassium iodide in sufficient 95 per cent. to produce 100; average dose, 1 decimil (1½ minims).

### TINCTURA IODI DECOLORATA.

#### DECOLOURISED TINCTURE OF IODINE.

Iodine	...	...	...	...	...	2'50
Strong Solution of Ammonia	...	...	...	...	...	6'25
Alcohol, sufficient to produce	...	...	...	...	...	100'00

Dissolve the iodine in 27·5 of alcohol, by the aid of gentle heat, cool, and add the strong solution of ammonia; keep the mixture in a warm place until decolourised, after which add sufficient alcohol to make up the required volume.

NOTES.—This preparation is simply a solution of ammonium iodide and iodate, and a similar preparation decolourised with sodium thiosulphate contains sodium iodide. Neither preparation has any counter-irritant action resembling that of free iodine.

### TINCTURA IPECACUANHÆ ET OPII.

#### TINCTURE OF IPECACUANHA AND OPIUM.

*Synonym.*—Tincture of Dover's Powder.

Tincture of Deodorised Opium	...	...	100'00
Liquid Extract of Ipecacuanha	...	...	10'00
Alcohol (60 per cent.), sufficient to produce	...	...	100'00

Evaporate the tincture in a tared capsule, on a water-bath, until it weighs 80; then cool, add the liquid extract, filter, and pass

sufficient of the alcohol through the filter to make up the required volume.

It is used as a diaphoretic in incipient colds, to relieve painful dyspepsia and to arrest diarrhœa.

*Dose.*—3 to 10 decimils (5 to 15 minims) for repeated administration; for a single administration,  $1\frac{1}{2}$  to 2 mils (20 to 30 minims).

*NOTE.*—This preparation corresponds to Tinctura Ipecacuanhæ et Opii, U.S.P.; average dose, 5 decimils (8 minims).

### TINCTURA JABORANDI.

#### TINCTURE OF JABORANDI.

Jaborandi Leaves, in No. 40 powder...	...	20·00
Alcohol (45 per cent.), sufficient to produce ...		100·00

Add 12·5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of jaborandi is employed as a diaphoretic and to promote the growth of hair. It is also added to hair lotions (1 in 8).

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA JALAPÆ.

#### TINCTURE OF JALAP.

Jalap, in No. 40 powder...	...	...	...	20·00
Alcohol, a sufficient quantity.				

Add 10 of alcohol to the drug, pack in a percolator, and percolate with more alcohol until the product measures 60; then press the marc, mix the expressed liquid with the percolate, filter after standing for twenty-four hours, and adjust the strength of the tincture, so that the finished product shall contain 1·5 per cent. w/v of jalap resin.

Tincture of jalap is used as a hydragogue cathartic to remove fluid from the body, relieve congestion, and lower blood pressure. Mixtures containing this tincture require the addition of one-eighth of their volume of mucilage of tragacanth to suspend the resin.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA JALAPÆ COMPOSITA.

#### COMPOUND TINCTURE OF JALAP.

Jalap, in No. 40 powder	...	...	...	8·00
Scammony, in No. 40 powder...	...	...	...	2·00
Turpeth, in No. 40 powder	...	...	...	1·00
Alcohol (60 per cent.), sufficient to produce ...				100·00

Add 10 of the alcohol to the mixed powders to moisten the mixture, and proceed as in the case of Tinctura Aconiti.



Compound tincture of jalap is official for use in India, the Eastern Colonies, and the North American Colonies. Mixtures containing this tincture require the addition of one-eighth of their volume of mucilage of tragacanth to suspend the resin.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## TINCTURA KALADANÆ.

### TINCTURE OF KALADANA.

Kaladana, in No. 40 powder ... ..	20·00
Alcohol (70 per cent.), sufficient to produce ...	100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of kaladana is official in India and the Eastern Colonies for use in place of tincture of jalap.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

## TINCTURA KINO.

### TINCTURE OF KINO.

Kino ... ..	10·00
Glycerin ... ..	15·00
Distilled Water... ..	25·00
Alcohol, sufficient to produce ... ..	100·00

Rub the kino to a smooth paste with a portion of the previously mixed glycerin and water, gradually add the remainder of the mixed liquids, add 50 of the alcohol, and allow to macerate for twelve hours, with frequent agitation; then filter through cotton wool, and pass sufficient alcohol through the filter to make up the required volume.

Tincture of kino is a favourite remedy with bismuth or chalk mixture in diarrhœa. It is sometimes added to mouth washes for its astringency. The tincture tends to gelatinise on keeping, owing to oxidation of the kinotannic acid in solution.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTES.—The following formula has been suggested as yielding a product which does not gelatinise on keeping:—Add 10 of powdered kino to 50 of boiling water in a suitable vessel, and maintain the whole at or near a temperature of 100° for half an hour, agitating frequently. Allow to cool, replace the water lost by evaporation, add 50 of alcohol, and set aside for twelve hours; then strain. Tinctura Kino, U.S.P., is prepared by triturating 5 of kino and 1 of purified talc with 15 of glycerin, diluted with 20 of water, heating the mixture on a water-bath for about one hour, then cooling, replacing the evaporated water, adding 65 of 95 per cent. alcohol, filtering through cotton wool, and adding sufficient alcohol to produce 100.

**TINCTURA KOLÆ.**

## TINCTURE OF KOLA.

Kola Seeds, in coarse powder ...	...	...	20'00
Alcohol (60 per cent.) ...	...	...	100'00

Maceration for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of kola is given as a cerebral stimulant in headache. Its action is similar to that of caffeine.

*Dose.*—1 to 4 mils (15 to 60 minims).

**TINCTURA KRAMERIÆ.**

## TINCTURE OF KRAMERIA.

*Synonym.*—Tincture of Rhatany.

Krameria Root, in No. 40 powder ...	...	20'00
Alcohol (60 per cent.), sufficient to produce ...	...	100'00

Add 10 of alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of krameria is used internally as an astringent, and externally to make a mouth wash or gargle by adding one teaspoonful to a wineglassful of water, for inflamed and spongy gums. It is somewhat weaker than tincture of catechu.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds to Tinctura Krameriæ, U.S.P., except that the latter is prepared with 49 per cent. alcohol.

**TINCTURA LACTUCARIL.**

## TINCTURE OF LACTUCARIUM.

Lactucarium, in coarse powder ...	...	50'00
Glycerin ...	...	25'00
Alcohol (70 per cent.) ...	...	70'00
Purified Benzin, a sufficient quantity.		

Alcohol (45 per cent.), sufficient to produce ... 100'00

Macerate the lactucarium with 200 of purified benzin for forty-eight hours, shaking frequently, then filter, allow to drain, wash the residue with 150 of the benzin, and allow the lactucarium to dry in a current of air. Reduce the dried lactucarium to powder, adding coarse sand, if necessary, to facilitate the operation, pack the powder in a percolator, moisten it with a menstruum prepared by mixing the glycerin with the alcohol (70 per cent.), allow it to macerate for twenty-four hours, then allow percolation to proceed, and percolate with the remainder of the mixed menstruum, afterwards percolating with alcohol (45 per cent.) until the drug is exhausted. Reserve the first 75 of percolate, evaporate the remainder to 25, mix the liquids, filter, and add sufficient alcohol (45 per cent.) to produce 100.

This tincture is used chiefly for the preparation of Syrupus Lactucarii, and is rarely, if ever, prescribed.

*Dose.*—1 to 2 mls (15 to 30 minims).

### TINCTURA LARICIS.

#### TINCTURE OF LARCH.

Larch Bark, in No. 20 powder	...	...	12·50
Alcohol, sufficient to produce	...	...	100·00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of larch is used as an expectorant in bronchitis, and diluted with 30 parts of water as an astringent lotion in leucorrhœa.

*Dose.*—1½ to 2 mls (20 to 30 minims).

NOTE.—Tinctura Laricis was official in the British Pharmacopœia, 1885.

### TINCTURA LAVANDULÆ COMPOSITA.

#### COMPOUND TINCTURE OF LAVENDER.

Oil of Lavender	...	...	...	0·47
Oil of Rosemary	...	...	...	0·05
Cinnamon Bark, bruised	...	...	...	0·85
Nutmeg, bruised	...	...	...	0·85
Red Sanders Wood	...	...	...	1·70
Alcohol	...	...	...	100·00

Macerate the drugs in the alcohol for seven days, and proceed as in the case of Tinctura Alstoniæ, finally dissolving the oils in the strained liquid.

Compound tincture of lavender is used as a flavouring and colouring agent.

*Dose.*—2 to 4 mls (½ to 1 fluid drachm).

NOTE.—Tinctura Lavandulæ Composita, U.S.P., is prepared with 0·8 of oil of lavender, 0·2 of oil of rosemary, 2 of Saigon cinnamon, 0·5 of cloves, 1 each of nutmeg and red sanders wood, and sufficient 72 per cent. alcohol to produce 100.

### TINCTURA LIMONIS.

#### TINCTURE OF LEMON.

*Synonym.*—Tincture of Lemon Peel.

Fresh Lemon Peel, cut small	...	...	25·00
Alcohol	...	...	100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of lemon is used as a flavouring agent.

*Dose.*—3 to 4 mls (½ to 1 fluid drachm).

NOTE.—Tinctura Limonis Corticis, U.S.P., is prepared by macerating 50 of fresh lemon peel with sufficient 95 per cent. alcohol to produce 100.



**TINCTURA LIMONIS FORTIS.**

## STRONG TINCTURE OF LEMON.

Fresh Lemon Peel, cut small	...	...	...	100'00
Alcohol	...	...	...	100'00

Macerate for thirty days, and proceed as in the case of Tinctura Alstoniæ.

This tincture is used as a flavouring agent.

*Dose.*—1 to 2 mils (15 to 30 minims).

**TINCTURA LOBELIÆ.**

## TINCTURE OF LOBELIA.

Lobelia, in No. 40 powder	...	...	...	12'50
Alcohol (60 per cent.), sufficient to produce	...	...	...	100'00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of lobelia is used in a similar way to the ethereal tincture.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims).

*NOTE.*—Tinctura Lobeliæ was official in the British Pharmacopœia, 1885.

**TINCTURA LOBELIÆ ÆTHEREA.**

## ETHEREAL TINCTURE OF LOBELIA.

Lobelia, in No. 40 powder	...	...	...	20'00
Spirit of Ether, sufficient to produce	...	...	...	100'00

Add 10 of spirit of ether to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

This preparation is used chiefly as an antispasmodic and expectorant in asthma and bronchitis.

*Dose.*—3 to 10 decimils (5 to 15 minims).

**TINCTURA LUPULI.**

## TINCTURE OF HOPS.

Hops	...	...	...	...	20'00
Alcohol (60 per cent.)	...	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of hops is used as a bitter and for its mildly sedative properties.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA LYCOPODII.**

## TINCTURE OF LYCOPODIUM.

Lycopodium	...	...	...	...	10'00
Alcohol	...	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of lycopodium is given for irritability of the bladder and incontinence of urine in children.

*Dose.*—1 to 4 mils (15 to 60 minims).

### TINCTURA MATICÆ.

#### TINCTURE OF MATICO.

Matico Leaves, in coarse powder	...	...	20'00
Alcohol (60 per cent.)...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of matico is applied externally as a styptic to small cuts, and is used internally in bladder catarrh.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

### TINCTURA MOSCHI.

#### TINCTURE OF MUSK.

Musk	...	...	...	...	5'00
Alcohol	...	...	...	...	50'00
Distilled Water	...	...	...	...	45'00
Alcohol (45 per cent.), sufficient to produce	...	...	...	...	100'00

Triturate the musk with the water until a smooth mixture is obtained, transfer to a bottle, and allow to stand for twenty-four hours; then add the alcohol (90 per cent.), macerate for six days with occasional agitation, filter, and pass sufficient alcohol (45 per cent.) through the filter to produce the required volume.

Tincture of musk is used as an antispasmodic in hysteria and asthma, and as a stimulant in pneumonia and other acute fevers.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

NOTE.—This preparation corresponds to Tinctura Moschi, U.S.P.

### TINCTURA MYRRHÆ.

#### TINCTURE OF MYRRH.

Myrrh, in coarse powder	...	...	20'00
Alcohol, sufficient to produce	...	...	100'00

Macerate the myrrh with 80 of alcohol for seven days, agitating frequently; then filter, and pass sufficient alcohol through the filter to make up the required volume.

Tincture of myrrh is used chiefly to make a mouth wash (1 in 30) for spongy gums and aphthous ulcerations. When added to lotions or mixtures in other than small quantities, the addition of mucilage of tragacanth is necessary to suspend the resin.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA MYRRHÆ COMPOSITA.**

## COMPOUND TINCTURE OF MYRRH.

*Synonyms.*—Tinctura Myrrhæ et Aloes; Horse Tincture of Myrrh.

Myrrh, in coarse powder	...	...	...	5'00
Barbados Aloes, in powder	...	...	...	5'00
Distilled Water	...	...	...	25'00
Alcohol	...	...	...	75'00

Macerate for seven days, with frequent agitation, and strain.

Compound tincture of myrrh is used in veterinary practice, to promote the healing of wounds.

**TINCTURA MYRRHÆ ET BORACIS.**

## TINCTURE OF MYRRH AND BORAX.

Tincture of Myrrh	...	...	...	37'50
Oil of Bergamot	...	...	...	0'20
Oil of Lemon	...	...	...	0'20
Oil of Orange	...	...	...	0'20
Oil of Neroli	...	...	...	0'10
Oil of Rosemary	...	...	...	0'20
Borax, in powder	...	...	...	2'50
Glycerin	...	...	...	5'00
Alcohol, sufficient to produce	...	...	...	100'00

Dissolve the borax in the glycerin by the aid of gentle heat; when cold add the tincture of myrrh, and the oils dissolved in sufficient alcohol to make up the required volume.

This preparation is used to make a mouth wash (1 in 20) for spongy gums and aphthous ulceration.

**TINCTURA NUCIS VOMICÆ.**

## TINCTURE OF NUX VOMICA.

Liquid Extract of Nux Vomica	...	...	16'66
Distilled Water	...	...	25'00
Alcohol, sufficient to produce	...	...	100'00

Add the liquid extract to the distilled water, mix, add sufficient alcohol to make up the required volume, and filter. The product should contain from 0'24 to 0'26 per cent. w/v of strychnine.

Tincture of nux vomica is employed wherever the action of strychnine is desired. The effect of the brucine is probably negligible. This tincture frequently contains an inconvenient proportion of fat (see Extractum Nucis Vomicæ Liquidum), so that it forms a cloudy mixture with water, fat globules separating. This may cause insoluble salts to agglomerate in indiffusible masses, and many dispensers therefore use a defatted tincture, or remove the fat by mixing the tincture with twice its bulk of water, subsequently filtering.

*Dose.*—3 to 10 decimils (5 to 15 minims).



NOTES.—Tinctura Nucis Vomicae, B.P. 1885, was prepared by dissolving 133 grains of extract of nux vomica (B.P. 1885) in 4 fluid ounces of distilled water, adding sufficient rectified spirit to produce 1 pint, and filtering if necessary; the product contained 0·23 per cent. w/v of total alkaloids (about half the strength of the present tincture), and was given in doses of 6 to 12 decimils (10 to 20 minims). Tinctura Nucis Vomica, U.S.P., is prepared by dissolving 2 of Extractum Nucis Vomicae, U.S.P., in a sufficient quantity of a mixture of 75 of 95 per cent. alcohol and 25 of water to produce 100; it should contain 0·1 per cent. w/v of strychnine.

### TINCTURA OLEÆ FOLIORUM.

#### TINCTURE OF OLIVE LEAVES.

Olive Leaves, in No. 20 powder ... .. 20·00

Alcohol (60 per cent.), sufficient to produce 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of olive leaves has been given as a bitter and "tonic"; also as an antiperiodic and febrifuge.

*Dose.*—1 to 4 mils (15 to 60 minims).

### TINCTURA OLIVERI CORTICIS.

#### TINCTURE OF OLIVER BARK.

Oliver Bark, in No. 40 powder ... .. 10·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of oliver bark is official in the Australasian Colonies, where it is used for similar purposes to tincture of cinnamon.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA OPII.

#### TINCTURE OF OPIUM.

*Synonym.*—Laudanum; Tinctura Thebaica.

Opium ... .. 7·50

Alcohol, a sufficient quantity.

Distilled Water, sufficient to produce about 100·00

Make the opium into a paste by the addition of 25 of distilled water heated to about 94°, set aside for six hours, add 25 of alcohol, mix, and set aside for twenty-four hours; then strain off the liquid, press the residue, mix the liquids, again set aside for twenty-four hours, and filter. Finally standardise, and adjust the strength of the tincture so that the finished product shall contain 0·75 per cent. w/v of anhydrous morphine.

Tincture of opium is largely employed for all the purposes to which the crude drug is applied; it is especially used in preference to the solutions of morphine to allay gastric and abdominal pain, in diarrhoea and dysentery and wherever delayed absorption is desirable. It is frequently added to lotions for local application to allay pain, but

as its action as an anodyne is central and not peripheral it can allay pain only after absorption. In the popular "lead and opium" lotion much of the lead is also rendered inactive through conversion into lead meconate. Tincture of opium is incompatible with alkaline carbonates, lime water, vegetable astringents, and the salts of copper, iron, lead, mercury, and zinc.

*Dose*.—3 to 10 decimils (5 to 15 minims) for repeated administration; for a single administration  $1\frac{1}{2}$  to 2 mils (20 to 30 minims).

*NOTES*.—Tinctura Opii contains the soluble matter of about 1 grain of opium in 15 minims. Tinctura Opii, U.S.P., is prepared by adding 40 of boiling water to 10 of granulated opium, stirring at intervals during twelve hours, then adding 40 of 95 per cent. alcohol, allowing to macerate for forty-eight hours, percolating and continuing the percolation with 49 per cent. alcohol until the product measures 100; it should contain from 1·2 to 1·25 per cent. w/v of morphine.

### TINCTURA OPII AMMONIATA.

#### AMMONIATED TINCTURE OF OPIUM.

*Synonym*.—Scotch Paregoric.

Tincture of Opium	...	...	...	...	15·00
Benzoic Acid	...	...	...	...	2·06
Oil of Anise	...	...	...	...	0·625
Solution of Ammonia	...	...	...	...	20·00
Alcohol, sufficient to produce	...	...	...	...	100·00

Add the benzoic acid and oil of anise to 60 of alcohol, dissolve, add the tincture and the solution of ammonia, shake well, filter, and add sufficient of the alcohol to make up the required volume.

This preparation is used generally with other expectorants to allay cough, and is a favourite sedative and hypnotic in heart disease. It is a more powerful preparation than Tinctura Camphoræ Composita, although its dose is the same.

*Dose*.—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE*.—Ammoniated tincture of opium contains the soluble matter of about 0·62 grain of opium in 1 fluid drachm.

### TINCTURA OPII CROCATÆ.

#### TINCTURE OF OPIUM WITH SAFFRON.

*Synonym*.—Sydenham's Laudanum.

Opium	...	...	...	...	...	5·00
Cinnamon Bark, bruised	...	...	...	...	...	1·00
Cloves, bruised	...	...	...	...	...	1·00
Saffron	...	...	...	...	...	5·00

Detannated Sherry, sufficient to produce ... 100·00

Macerate the solid ingredients with 100 of detannated sherry for seven days in a closed vessel, with occasional agitation; then filter and add sufficient of the sherry to make up the required volume.

This preparation is used as a gastro-intestinal sedative and carminative.

*Dose*.— $\frac{1}{2}$  to  $2\frac{1}{2}$  mils (10 to 40 minims).

**TINCTURA OPII DEODORATA.**

## TINCTURE OF DEODOURISED OPIUM.

Opium	...	...	...	...	...	7.50
Purified Benzin	...	...	...	...	...	7.50
Alcohol	...	...	...	...	...	20.00
Distilled Water, sufficient to produce	...	...	...	...	...	100.00

Heat 50 of distilled water to boiling, pour it on the opium, and stir the mixture frequently during twenty-four hours; then transfer to a percolator, and percolate with distilled water until the opium is exhausted. Concentrate the percolate to 15 by evaporation on a water-bath, cool, shake well for ten minutes with 6.5 of benzin, separate the benzin, repeat the shaking out with the remainder of the benzin, again separate, and evaporate the remaining liquid in a warm place until all odour of benzin has disappeared, completing the operation on a water-bath. Mix the deodourised liquid with 60 of distilled water, filter, add the alcohol to the filtrate, and wash the filter with sufficient distilled water to produce 100. Finally standardise, and adjust the strength of the tincture so that the finished product shall contain 0.75 per cent. of anhydrous morphine.

This preparation is used similarly to Tinctura Opii.

*Dose.*—3 to 10 decimils (5 to 15 minims), for repeated administration; for a single administration  $1\frac{1}{2}$  to 2 mils (20 to 30 minims).

*NOTE.*—Tinctura Opii Deodorata, U.S.P., is prepared in the same way, with 10 of granulated opium, and contains 1.20 to 1.25 per cent. of morphine.

**TINCTURA PERSIONIS.**

## TINCTURE OF CUDBEAR.

Cudbear, in fine powder	...	...	...	...	12.50
Alcohol	...	...	...	...	35.00
Distilled Water, sufficient to produce...	...	...	...	...	100.00

Mix the alcohol with 70 of distilled water, moisten the powder with 10 of the mixture, and proceed as in the case of Tinctura Aconiti, adding more distilled water, if necessary, to make up the required volume.

This preparation is used to impart a bright red colour to acid liquids. The addition of about 10 per cent. of burnt sugar to the tincture will render it suitable for imparting a brownish-red tint.

**TINCTURA PHOSPHORI COMPOSITA.**

## COMPOUND TINCTURE OF PHOSPHORUS.

Phosphorus	...	...	...	...	...	0.20
Chloroform	...	...	...	...	...	17.00
Absolute Alcohol, sufficient to produce	...	...	...	...	...	100.00

Place the phosphorus and chloroform in a stoppered bottle, and heat on a water-bath till solution is effected; then add the absolute alcohol, and shake well.



Compound tincture of phosphorus is used in place of the official oil. It may be diluted with glycerin (see Elixir Phosphori), but is not miscible with water.

*Dose.*—2 to 7 decimils (3 to 12 minims).

*NOTE.*—Compound tincture of phosphorus should be kept in a well-stoppered bottle in a dark place.

### TINCTURA PHYSOSTIGMATIS.

#### TINCTURE OF CALABAR BEAN.

*Synonym.*—Tincture of Physostigma.

Calabar Bean, in No. 40 powder ... .. 20·00

Alcohol, sufficient to produce ... .. 100·00

Add 10 of alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

This tincture is used in paralysis and other nervous diseases, apparently for the exciting action of the drug on motor nerve-endings.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTE.*—Tinctura Physostigmatis, U.S.P., is prepared by extracting 10 of calabar bean with sufficient 95 per cent. alcohol to produce 100, and should contain 0·014 per cent. w/v of alkaloids.

### TINCTURA PHYTOLACCÆ.

#### TINCTURE OF PHYTOLACCA.

Poke Root ... .. 10·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of phytolacca is used empirically in chronic rheumatism.

*Dose.*—2 to 6 decimils (3 to 10 minims).

### TINCTURA PICRORRHIZÆ.

#### TINCTURE OF PICRORRHIZA.

Picrorrhiza, cut small, and well bruised ... 12·50

Alcohol (45 per cent.) ... .. 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of picrorrhiza is official in India and the Eastern Colonies for use as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA PODOPHYLLI.

#### TINCTURE OF PODOPHYLLUM.

Podophyllum Resin ... .. 3·65

Alcohol, sufficient to produce ... .. 100·00

Macerate the resin with 90 of alcohol for twenty-four hours,

with occasional agitation; then filter, and pass sufficient alcohol through the filter to make up the required volume.

Tincture of podophyllum is used as a purgative and cholagogue generally with other purgatives. Mixtures containing this tincture with a mineral acid usually require the addition of one-sixteenth of their bulk of mucilage of acacia.

*Dose.*—3 to 10 decimils (5 to 15 minims).

### TINCTURA PODOPHYLLI AMMONIATA.

AMMONIATED TINCTURE OF PODOPHYLLUM.

Podophyllum Resin	...	...	...	...	2'00
Aromatic Spirit of Ammonia, sufficient to produce	...	...	...	...	100'00

Macerate the resin with 90 of the spirit for twenty-four hours, with occasional agitation; then filter, and pass sufficient spirit of ammonia through the filter to make up the required volume.

This preparation is used in a similar way to Tinctura Podophylli, but is miscible with water without precipitation of the resin.

*Dose.*—6 to 12 decimils (10 to 20 minims).

### TINCTURA PODOPHYLLI INDICI.

TINCTURE OF INDIAN PODOPHYLLUM.

Indian Podophyllum Resin	...	...	...	3'65
Alcohol, sufficient to produce	...	...	...	100'00

Macerate the resin with 90 of alcohol for twenty-four hours, with occasional agitation; then filter, and pass sufficient alcohol through the filter to make up the required volume.

Tincture of Indian podophyllum is official in India and the Eastern Colonies, for use in place of Tinctura Podophylli.

*Dose.*—3 to 10 decimils (5 to 15 minims).

### TINCTURA PRUNI VIRGINIANÆ.

TINCTURE OF WILD CHERRY.

*Synonym.*—Tincture of Virginian Prune.

Wild Cherry Bark, in No. 20 powder...	...	20'00
Alcohol	...	62'50
Distilled Water	...	37'50

Add the powdered bark to the distilled water, mix and set the mixture aside for twenty-four hours; then add the alcohol, allow to macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of wild cherry is a mild sedative for use in cough and bronchitis.

*Dose.*—2 to 4 mls ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA PULSATILLÆ.**

## TINCTURE OF PULSATILLA.

Pulsatilla, in No. 20 powder ...	...	...	10'00
Alcohol (60 per cent.), sufficient to produce ...	...	...	100'00

Add a sufficient quantity of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of pulsatilla is taken in small repeated doses for amenorrhœa and dysmenorrhœa.

*Dose.*— $\frac{1}{4}$  to 2 mils (5 to 30 minims).

**TINCTURA PYRETHRI.**

## TINCTURE OF PYRETHRUM.

*Synonym.*—Tincture of Pellitory.

Pyrethrum Root, in No. 50 powder ...	...	...	20'00
Alcohol, sufficient to produce ...	...	...	100'00

Add 80 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of pyrethrum is used chiefly to rub along the gums or to apply on cotton wool in toothache, for which purpose it may be mixed with camphorated chloroform.

*NOTE.*—This preparation corresponds to Tinctura Pyrethri, U.S.P.

**TINCTURA PYRETHRI FLORUM.**

## TINCTURE OF PYRETHRUM FLOWERS.

Pyrethrum Flowers, in fine powder ...	...	...	25'00
Alcohol (60 per cent.), sufficient to produce ...	...	...	100'00

Add sufficient of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of pyrethrum flowers diluted with 10 parts of distilled water is used as a lotion to keep away insects.

**TINCTURA QUASSIÆ.**

## TINCTURE OF QUASSIA.

Quassia Wood, rasped ...	...	...	...	10'00
Alcohol (45 per cent.) ...	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of quassia is used as a bitter. It is compatible with the salts of iron.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Quassiæ, U.S.P., is prepared by extracting 20 of quassia wood, in No. 50 powder, with sufficient 62 per cent. alcohol to produce 100; average dose, 2 mils (30 minims).



**TINCTURA QUEBRACHO.**

## TINCTURE OF QUEBRACHO.

Quebracho Bark, in powder	...	...	...	20'00
Alcohol (60 per cent.)	...	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of quebracho is used as a bitter and as a febrifuge in fevers. It has a marked stimulant action on the respiratory centre in the medulla.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA QUILLAIÆ.**

## TINCTURE OF QUILLAIÆ.

Quillaia Bark, in No. 20 powder	...	...	5'00
Alcohol (60 per cent.), sufficient to produce	...	...	100'00

Add 2·5 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of quillaia is rarely given internally, but has been recommended as an expectorant. It is a valuable emulsifying agent for oils and oleoresins, *e.g.*, cod-liver oil, oil of turpentine, terebene, castor oil, liquid extract of male fern, etc., the amount of tincture required varying from one-fifteenth to one-half the quantity of oil to be emulsified according to its nature.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Quillajæ, U.S.P., is prepared by boiling 20 of quillaia bark, in No. 20 powder, with 80 of water for fifteen minutes, then straining, washing the residue on the strainer with 20 of boiling water, evaporating the mixed liquids to 60, adding 35 of 95 per cent. alcohol to the cooled liquid, setting aside to clear, filtering, and passing sufficient water through the filter to produce 100.

**TINCTURA QUININÆ.**

## TINCTURE OF QUININE.

Quinine Hydrochloride	...	...	...	2'00
Tincture of Orange	...	...	...	100'00

Add the quinine hydrochloride to the tincture of orange, dissolve, and filter if necessary.

Tincture of quinine is a useful form of administering the alkaloid as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA QUININÆ AMMONIATA.**

## AMMONIATED TINCTURE OF QUININE.

Quinine Sulphate	...	...	...	2'00
Solution of Ammonia	...	...	...	10'00
Alcohol (60 per cent.)	...	...	...	90'00

Add the quinine to the solution of ammonia and alcohol previously

mixed, shake until solution is effected, set aside for three days, and filter.

This preparation is a popular remedy for colds. It has the combined action of small doses of quinine and ammonia. Mixtures containing ammoniated tincture of quinine require the addition of one-sixteenth to one-eighth of their bulk of mucilage of acacia, according to the amount of tincture present. It is miscible with hot water and with aerated water, without precipitation.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—The deposit sometimes found in this tincture consists of cinchonidine sulphate, present as an impurity in the official quinine sulphate.

### TINCTURA RHEI AQUOSA.

#### AQUEOUS TINCTURE OF RHUBARB.

Rhubarb Root, in slices	...	...	...	10'00
Borax	...	...	...	1'00
Potassium Carbonate	...	...	...	1'00
Cinnamon Water	...	...	...	15'00
Alcohol	...	...	...	9'00
Distilled Water, boiling	...	...	...	90'00

Add the rhubarb, borax, and potassium carbonate to the boiling distilled water, allow to digest in a closed flask for fifteen minutes, then add the alcohol, allow to stand for one hour, filter through flannel, gently pressing the insoluble portion so as to obtain 85 of filtrate, and add the cinnamon water.

This preparation is used as a purgative and stomachic.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

### TINCTURA RHEI COMPOSITA.

#### COMPOUND TINCTURE OF RHUBARB.

*Synonyms.*—Tinctura Rhei; Tincture of Rhubarb.

Rhubarb Root, in No. 20 powder	...	...	10'00
Cardamom Seeds, bruised	...	...	1'25
Coriander Fruit, bruised	...	...	1'25
Glycerin	...	...	10'00

Alcohol (60 per cent.), a sufficient quantity.

Add 10 of the alcohol to the drugs to moisten the mixture, and proceed as in the case of Tinctura Aconiti until the percolate measures 90; then shake well, allow to stand for forty-eight hours, filter, and mix the filtrate with the glycerin.

Compound tincture of rhubarb is given as a purgative in dyspepsia associated with constipation, and in diarrhoea due to intestinal irritation. It is commonly given with antacids.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm), for repeated administration; for a single administration, 8 to 15 mils (2 to 4 fluid drachms).

*NOTES.*—Tinctura Rhei, B.P. 1885, was prepared with saffron, 1·25 per cent., and without the addition of glycerin, the menstruum being proof spirit. *Dose,*

as a stomachic, 4 to 8 mls (1 to 2 fluid drachms); as a purgative, 15 to 30 mls (4 to 8 fluid drachms). Tinctura Rhei, U.S.P., is prepared with 20 of rhubarb root, 4 of cardamom fruit, 10 of glycerin, and sufficient 53 per cent. alcohol to produce 100; average dose, 4 mls (1 fluid drachm). Tinctura Rhei Aromatica, U.S.P., is prepared with 20 of rhubarb root, 4 each of Saigon cinnamon and cloves, 2 of nutmeg, 10 of glycerin, and sufficient 53 per cent. alcohol to produce 100; average dose of the aromatic tincture of rhubarb, 2 mls (30 minims).

### TINCTURA SABINÆ.

#### TINCTURE OF SAVIN.

Savin Tops, dried and coarsely powdered ... 10'00

Alcohol (60 per cent.), sufficient to produce ... 100'00

Add 10 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of savin has been given as an emmenagogue, but is rarely employed

*Dose.*—1½ to 4 mls (20 to 60 minims).

*NOTE.*—Tinctura Sabinæ was official in the British Pharmacopœia, 1885.

### TINCTURA SANGUINARIÆ.

#### TINCTURE OF SANGUINARIA.

*Synonym.*—Tincture of Blood Root.

Sanguinaria, in No. 60 powder ... 10'00

Acetic Acid ... 2'00

Alcohol, a sufficient quantity.

Distilled Water, sufficient to produce ... 100'00

Add 60 of alcohol to 40 of distilled water, and moisten the drug with the acetic acid and 30 of this mixture; then proceed as in the case of Tinctura Aconiti.

This tincture is occasionally used as a stimulating expectorant in chronic bronchitis.

*Dose.*—½ to 2 mls (8 to 30 minims).

*NOTE.*—This preparation corresponds to Tinctura Sanguinariæ, U.S.P.

### TINCTURA SCILLÆ.

#### TINCTURE OF SQUILL.

Squill, bruised ... 20'00

Alcohol (60 per cent.) ... 100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of squill is used with other expectorants to relieve cough, and in chronic bronchitis. It is also given as a cardiac tonic.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTES.*—A preparation which corresponds closely to the official Tinctura Scillæ is obtained by mixing 20 of liquid extract of squill with 80 of alcohol (60 per cent.). Tinctura Scillæ, U.S.P., is prepared by macerating 10 of squill in No. 20 powder, with sufficient 71 per cent. alcohol to produce 100.



**TINCTURA SENEGÆ.**

## TINCTURE OF SENEGA.

Senega Root, in No. 40 powder ... 20·00

Alcohol (60 per cent.), sufficient to produce ... 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of senega is employed as a stimulating expectorant in chronic bronchitis, usually combined with other expectorants.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA SENNÆ COMPOSITA.**

## COMPOUND TINCTURE OF SENNA.

Senna, broken small ... 20·00

Raisins, freed from seeds ... 10·00

Caraway Fruit, bruised ... 2·50

Coriander Fruit, bruised ... 2·50

Alcohol (45 per cent.) ... 100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Compound tincture of senna is used as a purgative, often with saline cathartics. It is pleasanter than the infusion.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm), for repeated administration; for a single administration, 8 to 15 mils (2 to 4 fluid drachms).

**TINCTURA SERPENTARIÆ.**

## TINCTURE OF SERPENTARY.

Serpentary Rhizome, in No. 40 powder ... 20·00

Alcohol (70 per cent.), sufficient to produce ... 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of serpentary is used as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—This preparation corresponds to Tinctura Serpentaria, U.S.P.

**TINCTURA STRAMONII.**

## TINCTURE OF STRAMONIUM.

Stramonium Leaves, in No. 20 powder ... 20·00

Alcohol (45 per cent.), sufficient to produce ... 100·00

Add 20 of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of stramonium is used with other antispasmodics in asthma; its action is due to atropine.

*Dose.*—3 to 10 decimils (5 to 15 minims).

NOTE.—Tinctura Stramonii, U.S.P., is prepared by extracting 10 of stramonium, in No. 60 powder, with sufficient 49 per cent. alcohol to produce 100, and should contain 0.03 per cent. w/v of mydriatic alkaloids.

### TINCTURA STROPHANTHI.

#### TINCTURE OF STROPHANTHUS.

Strophanthus Seeds, in No. 30 powder	...	2.50
Alcohol (70 per cent.), sufficient to produce	...	100.00

Add 0.6 of the alcohol to the drug, after packing it in a percolator, and allow to macerate for forty-eight hours; then percolate slowly with successive portions of the alcohol until the product measures 50, filter, and add sufficient of the alcohol to make up the required volume.

Tincture of strophanthus is used as a cardiac tonic. Its action is extremely rapid and it is therefore preferred in sudden heart failure. It is given in small doses to prevent cardiac failure in acute diseases. The official dose is considered to be too large; the best results are obtained with doses of 1 to 3 decimils (2 to 5 minims). It is well to use a standardised tincture of such a strength that  $\frac{1}{4}$  minim will kill a 20-gramme frog in an hour by causing the heart to stand still in systole. As tincture of strophanthus varies so greatly in its activity, this method of adopting a physiological standard is the only one which, at present, ensures a reliable tincture.

*Dose.*—3 to 10 decimils (5 to 15 minims).

NOTES.—Tinctura Strophanthi, B.P., 1885, was twice the strength of the above preparation, and was made by percolating the strophanthus, previously defatted with ether, with rectified spirit; it was given in doses of 1 to 6 decimils (2 to 10 minims). Tinctura Strophanthi, U.S.P., is prepared by extracting 10 of strophanthus, in No. 60 powder, with sufficient 62 per cent. alcohol to produce 100; average dose, 5 decimils (8 minims).

### TINCTURA SUMBUL.

#### TINCTURE OF SUMBUL.

Sumbul Root, bruised	...	...	...	10.00
Alcohol (70 per cent.)	...	...	...	100.00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of sumbul is used as an antispasmodic in hysteria and nervous complaints.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA TINOSPORÆ.

#### TINCTURE OF TINOSPORA.

Tinospora, in No. 20 powder	...	...	20.00
Alcohol (60 per cent.)	...	...	100.00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of tinospora is official in India and the Eastern Colonies for use as a bitter.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

### TINCTURA TOLUTANA.

#### TINCTURE OF TOLU.

*Synonym.*—Tincture of Balsam of Tolu.

Balsam of Tolu...	...	...	...	10°00
Alcohol, sufficient to produce ...	...	...	...	100°00

Macerate the balsam of tolu with 80 of alcohol, shaking occasionally until solution is effected; then filter, and pass sufficient alcohol through the filter to make up the required volume.

Tincture of tolu is used as a disinfectant expectorant in chronic bronchitis. Mixtures containing this tincture require the addition of one-eighth of their bulk of mucilage of acacia to suspend the resin in a diffusible form.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Tolutana, U.S.P., is prepared by macerating 20 of balsam of tolu with sufficient 95 per cent. alcohol to produce 100. Average dose, 2 mils (30 minims).

### TINCTURA URGINEÆ.

#### TINCTURE OF URGINEA.

Urginea, bruised	...	...	...	20°00
Alcohol (60 per cent.)	...	...	...	100°00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Tincture of urguinea is official in India and the Eastern Colonies for use in place of tincture of squill.

*Dose.*—3 to 10 decimils (5 to 15 minims).

### TINCTURA VALERIANÆ.

#### TINCTURE OF VALERIAN.

Valerian Rhizome, in No. 60 powder	...	20°00
Alcohol (70 per cent.), sufficient to produce ...	...	100°00

Add sufficient of the alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of valerian is used in a similar way to ammoniated tincture of valerian.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTES.*—This preparation corresponds to Tinctura Valerianæ, U.S.P. Tinctura Valerianæ, B.P., 1885, was prepared by macerating and percolating 12½ of valerian rhizome, in No. 40 powder, with sufficient proof spirit to produce 100. *Dose*, 4 to 8 mils (1 to 2 fluid drachms).



**TINCTURA VALERIANÆ AMMONIATA.**

AMMONIATED TINCTURE OF VALERIAN.

Valerian Rhizome, in No. 40 powder	...	20'00
Oil of Nutmeg ... ..	...	0'31
Oil of Lemon ... ..	...	0'21
Solution of Ammonia ... ..	...	10'00
Alcohol (60 per cent.) ... ..	...	90'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

This preparation is used in hysteria and functional nervous disorders.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Valerianæ Ammoniata, U.S.P., is prepared by extracting 20 of valerian, in No. 60 powder, with sufficient Spiritus Ammoniæ Aromaticus, U.S.P., to produce 100; average dose, 2 mils (30 minims).

**TINCTURA VALERIANÆ INDICÆ AMMONIATA.**

AMMONIATED TINCTURE OF INDIAN VALERIAN.

Indian Valerian, in No. 40 powder	...	20'00
Oil of Nutmeg ... ..	...	0'31
Oil of Lemon ... ..	...	0'21
Solution of Ammonia ... ..	...	10'00
Alcohol (60 per cent.) ... ..	...	90'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Ammoniated tincture of Indian valerian is official in India and the Eastern Colonies for use in place of Tinctura Valerianæ Ammoniata.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

**TINCTURA VANILLÆ.**

TINCTURE OF VANILLA.

*Synonym.*—Essence of Vanilla.

Vanilla, cut into small pieces, and bruised	...	10'00
Refined Sugar, in coarse powder	...	20'00
Alcohol, a sufficient quantity.		
Distilled Water, sufficient to produce	...	100'00

Add 70 of alcohol to 30 of distilled water, macerate the vanilla in 50 of the mixture for seven days, strain off the liquid, and set aside; beat the marc with the sugar in a mortar to a uniform powder, transfer to a percolator, and percolate with the reserved liquid, continuing the operation with sufficient of the menstruum to produce the required volume.

Tincture of vanilla is used as a flavouring agent.

*NOTE.*—This preparation corresponds to Tinctura Vanillæ, U.S.P.

**TINCTURA VERATRI.**

## TINCTURE OF VERATRUM.

*Synonym.*—Tincture of Green Hellebore.

Veratrum Rhizome, in No. 60 powder	...	...	10'00
Alcohol, sufficient to produce	...	...	100'00

Add 40 of alcohol to the drug, and proceed as in the case of Tinctura Aconiti.

Tincture of green hellebore has been recommended as an arterial depressant in apoplexy from hæmorrhage or effusion, and to check the convulsions of uræmia and eclampsia. In reality it raises blood pressure by constricting vessels, and is the worst possible treatment in such cases. It is used in America in much the same way as tincture of aconite.

*Dose.*—3 to 10 decimils (5 to 15 minims).

*NOTES.*—This preparation corresponds to Tinctura Veratri, U.S.P. Tinctura Veratri Viridis, B.P., 1885, was prepared by macerating and percolating 20 of veratrum or green hellebore rhizome with sufficient rectified spirit to produce 100; dose, 3 to 10 decimils (5 to 20 minims).

**TINCTURA ZINGIBERIS.**

## TINCTURE OF GINGER.

Ginger, in No. 40 powder	...	...	...	10'00
Alcohol, sufficient to produce	...	...	...	100'00

Add 10 of alcohol to the drug to moisten it, and proceed as in the case of Tinctura Aconiti.

Tincture of ginger is used as a carminative and aromatic stimulant in atonic dyspepsia and flatulence. It is added to purgative medicines to prevent griping.

*Dose.*—2 to 4 mils ( $\frac{1}{2}$  to 1 fluid drachm).

*NOTE.*—Tinctura Zingiberis, U.S.P., is prepared by extracting 20 of ginger, in No. 50 powder, with sufficient 95 per cent. alcohol to produce 100; average dose, 2 mils (30 minims).

**TINCTURA ZINGIBERIS FORTIOR.**

## STRONG TINCTURE OF GINGER.

*Synonyms.*—Essence of Ginger; Liquid Extract of Ginger.

Ginger, in fine powder	...	...	...	50'00
Alcohol, sufficient to produce	...	...	...	100'00

Pack the ginger tightly in a percolator, and pour over it 50 of the alcohol; at the expiration of two hours add more alcohol, and allow it to percolate slowly until the required volume is obtained.

It is used similarly to Tinctura Zingiberis.

*Dose.*—3 to 12 decimils (5 to 20 minims).

*NOTE.*—This preparation was official in the British Pharmacopœia, 1885; it resembles Fluidextractum Zingiberis, U.S.P., but is only half the strength of the latter.

**TINCTURÆ.****TINCTURES.**

Tinctures, properly so-called, are preparations obtained by macerating or percolating crude drugs with alcohol, by dissolving definite chemical substances or proximate principles in alcohol, or by diluting extracts, etc., of drugs with alcohol. The official processes of maceration and percolation are those described in the cases of *Tinctura Alstoniæ* and *Tinctura Aconiti* respectively; the processes of solution and dilution vary according to the nature of the substances dealt with. Tinctures of fresh herbs, for which formulæ are not given, may be prepared by the process of maceration, 50 of the cut, bruised, or crushed fresh herb being treated with 100 of alcohol (90 per cent.). Ethereal tinctures are prepared from certain drugs by substituting pure ether for alcohol, and are useful when quicker absorption is desired. So-called aqueous or glycerin tinctures are prepared by extracting the finely-powdered drugs with a mixture containing  $2\frac{1}{2}$  of acetic acid, 25 of glycerin, and sufficient distilled water to produce 100 by volume, or a similar mixture may be used to dissolve extracts of the drugs, from which the alcohol has been removed by evaporation at a low temperature.

**TINOSPORA.****TINOSPORA.**

*Synonym.*—Gulancha.

*Tinospora* consists of the dried stem of *Tinospora cordifolia*, Miers (N.O. Menispermaceæ), a climbing shrub indigenous to tropical India. The stems are collected in the hot season and dried.

The drug occurs in light, straight or twisted cylindrical pieces and in slices, averaging about 2 centimetres in diameter, some pieces being much smaller. Externally they are covered with a thin, papery, brown cork, bearing the raised scars of numerous lenticels. The cork readily exfoliates and discloses a greenish cortex longitudinally wrinkled and marked with lenticels. The fracture is fibrous and the transverse section exhibits a yellowish wood with radially arranged wedge-shaped wood bundles, containing large vessels, separated by narrower medullary rays. The odour is not characteristic, but the taste is bitter.

The chief constituents of the drug are the yellow alkaloid, berberine, and a glucosidal bitter principle; the drug also contains starch.

*Tinospora* is official in India and the Eastern Colonies. It is used as a bitter similarly to *calumba*. An infusion, concentrated liquor, and tincture of the drug are prepared.

**TODDALIA.****TODDALIA.**

*Toddalia* consists of the dried root bark of *Toddalia aculeata*, Pers. (N.O. Rutaceæ), a shrub growing in India and Ceylon.



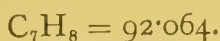
The bark occurs in quilled pieces about 2·3 millimetres thick, longitudinally furrowed and wrinkled, and covered with a soft, yellowish periderm, which on being scraped discloses a bright yellow surface beneath, and below this a darker, brown layer. The inner surface is dark brown and granular, the fracture brittle, the fractured surface exhibiting the outer yellow periderm, the brighter layer beneath, and an inner layer of brown phloem, in which oleo-resin ducts are situated. The odour of the drug is aromatic, the taste aromatic and bitter.

The chief constituents of the bark are a yellow resin, a bitter principle, and a volatile oil, green in colour, and having an odour resembling that of citron.

Toddalia is official in India and the Eastern Colonies. It is used as an aromatic bitter similarly to cusparia. An infusion and concentrated liquor are prepared.

## TOLUENE.

### TOLUENE.



*Synonyms.*—Toluol; Methyl-benzene.

Toluene, or methyl-benzene,  $\text{C}_6\text{H}_5\text{CH}_3$ , was originally obtained by the dry distillation of tolu balsam, hence its name. It may be obtained in the same way from many other resins. It occurs in wood-tar along with xylene, paraffin, naphthalene, and other hydrocarbons, and is present to a considerable extent in coal-tar naphtha. It is obtained from the light tar oils, after purification, with diluted sulphuric acid and solution of sodium hydroxide, by submitting the purified oils to a low temperature, when the benzene crystallises out. The benzene may be separated from the toluene, etc., by draining, the toluene being obtained finally by fractional distillation.

It occurs as a colourless liquid, light, mobile, highly refractive, and having an odour distinct from that of benzene. Nearly insoluble in water, but communicating to it its odour. Soluble in alcohol, ether, chloroform, carbon bisulphide, acetone, and glacial acetic acid. It dissolves sulphur, phosphorus, and iodine. Specific gravity, 0·872; boiling-point, 109° to 111°. Toluene remains liquid at -20°. It burns with a luminous and very sooty flame. When toluene is boiled with chromic or diluted nitric acid, the methyl group is gradually oxidised to carboxyl with formation of benzoic acid. Concentrated nitric acid converts it into several nitrotoluenes. Dinitrotoluene is used for deblooming oils. When treated with formaldehyde-sulphuric acid, it gives a dark brown precipitate. The solidifying point affords a ready means of distinguishing between benzene and toluene, the former solidifying at +5°, the latter remaining liquid at much lower temperatures.

Toluene is said to have five times the expansive capacity of mercury, and for this reason has been used, coloured, for filling thermometers. It is largely used in the aniline dye industry, in the production of artificial musk and artificial oil of bitter almonds, and as a solvent. Benzol of the British Pharmacopœia contains from 20 to 30 per cent. of toluene.

## TONCO SEMINA.

### TONCO SEEDS.

*Synonyms.*—Tonka Beans; Tonquin Beans.

Tonco seeds are the product of *Dipteryx odorata*, Willd. (N.O. Leguminosæ), and *D. oppositifolia*, Willd., the former indigenous to Guiana, the latter to Brazil. The trees produce fruits about the size of a large egg, the seeds being imbedded in a pulp which is surrounded by a hard fibrous shell. The seeds are separated and dried. They are often "frosted" by steeping them in rum and then spreading them out to dry.

The seeds are usually 3 to 4 centimetres in length, and resemble Jordan almonds in shape. The surface is nearly black, much wrinkled, and, in the case of frosted beans, covered with minute, whitish crystals of coumarin. Each seed contains two yellowish-brown, oily cotyledons. The odour is fragrant, taste aromatic and bitter.

The chief constituent of tonco beans is coumarin, of which they may contain as much as 3 per cent., while the fixed oil in the cotyledons may amount to 25 per cent.

Tonco seeds were formerly used as the source of coumarin, but the greater part of this substance employed is now produced synthetically (see Coumarinum).

## TRAGACANTHA.

### TRAGACANTH.

Tragacanth is a gum obtained by exudation from the stem of *Astragalus gummifer*, Labill. (N.O. Leguminosæ), a small shrub indigenous to the Turkish Empire and Persia. It is produced by the gummosis of the cell walls of the pith and medullary rays, and, swelling by the absorption of water, exerts considerable pressure in the interior of the stem, eventually forcing itself out through cracks or through artificial incisions. It is collected when dry and graded for the market. That which has been exuded from elongated incisions dries in flakes and is known as "flake" tragacanth, while that which has been pressed through more or less rounded holes dries in tears or vermiform pieces; the inferior qualities are termed sorts, known as "vermicelli" tragacanth.

Two varieties of flake tragacanth are known in commerce, viz., Syrian (or Persian) and Smyrna, the former being alone official. Syrian Tragacanth occurs in thin, white or pale yellowish-white, horny, translucent, ribbon-like flakes, frequently about 25 millimetres

long and 12 millimetres wide. They are more or less curved, marked on the flat sides with concentric ridges, inodorous and tasteless. It swells in water to a gelatinous mass, but only about 8 or 10 per cent. dissolves.

The composition of tragacanth has not yet been satisfactorily ascertained. The part soluble in water appears to consist chiefly of polyarabinon-trigalactan-geddlic acid, and yields by hydrolysis arabinose, galactose, and geddic acid. The portion insoluble in water yields under the influence of baryta water isomeric  $\alpha$ - and  $\beta$ -tragacanthan-xylan-bassoric acids, which yield by hydrolysis tragacanthose, xylose, and bassoric acid. The gum contains from 9 to 15 per cent. of moisture, and yields about 3 per cent. of ash. Traces of starch and of altered cellulose are also to be found in the gum.

Tragacanth is employed in pharmacy as a suspending agent in mixtures containing resinous tinctures and heavy insoluble powders, or to emulsify volatile oils. Mucilage of tragacanth and compound powder of tragacanth are used for these purposes, the latter combining the suspending powers of tragacanth and acacia, whilst the starch present tends to prevent agglomeration of the deposit. The mucilage of tragacanth is an efficient suspending agent for the resins of tincture of jalap and tincture of myrrh; it is also employed instead of acacia when substances incompatible with the latter are present. Mucilage of tragacanth is preferred to mucilage of acacia for use in lotions for external use. With essential oils tragacanth forms a coarse emulsion, which separates on standing, but is readily miscible; the gum should be added to the oil in a dry bottle in the proportion of 1 part of tragacanth to 10 parts of oil; shake, add 72 parts of water and agitate vigorously; then add water in successive portions to the required volume. Tragacanth is also used to form a drying liniment for the skin, which may be used as a basis for the application of ammonium ichthosulphonate, salicylic acid, resorcin, sulphur, etc. A typical preparation, known as Bassorin Paste or Linimentum Exsiccans, is made by mixing in a wide-mouthed bottle 5 of tragacanth powder with 10 of alcohol, adding 70 of water, shaking vigorously, and adding 2 of glycerin with sufficient water to make 100. It dries on the skin, forming a transparent film easily removed by washing. Tragacanth is used sparingly as an excipient to bind pill masses; glycerin of tragacanth is a useful excipient, which should be used in the smallest possible quantity, the mass being well kneaded. A useful excipient for metallic and insoluble salts consists of equal weights of manna and glycerin of tragacanth, beaten together. Glucanth is a pill excipient prepared by mixing 1 of tragacanth in powder with 1 of distilled water and 4 of syrup of glucose.

NOTES.—Syrian tragacanth contains only a minute trace of starch, but the Smyrna variety contains appreciable quantities; the latter variety is also more opaque and less ribbon-like. Hog gum or Caramania gum occurs in yellowish or yellowish-brown, opaque tears or vermiform pieces, which are occasionally whitened by dusting them with lead carbonate; it is said to be obtained from a species of *Prunus*, not *Astragalus*.



**TRIMETHYLAMINA.**

TRIMETHYLAMINE.



Trimethylamine,  $(\text{CH}_3)_3\text{N}$ , is not infrequently found in the flowers of hawthorn and wild cherry; also in arnica, ergot, guano, and herring-roë. It may be obtained economically by distilling herring-brine, in which it exists in considerable quantity, with lime. The alkaline distillate from this mixture is neutralised with hydrochloric acid and evaporated; the saline residue is treated with absolute alcohol, which leaves ammonium chloride undissolved. The alcoholic solution is evaporated, the residue redissolved in a little water and again carefully distilled with lime. The vapours evolved are condensed by means of ice, or conducted into water. Large quantities are now obtained from the residues left in the refinement of beet sugar.

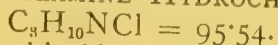
It occurs at low temperatures as a thin, colourless, or pale yellow, transparent, strongly alkaline liquid, having a strong, ammoniacal odour besides the peculiar odour of herring-pickle. At ordinary temperatures it is a colourless gas. It is inflammable, and has a strong alkaline reaction. Readily soluble in water and in alcohol. Specific gravity at  $0^\circ$ , 0.673. Boiling-point,  $9.8^\circ$ . Trimethylamine is isomeric with propylamine, which boils at  $49^\circ$  to  $50^\circ$ , and is sometimes incorrectly called by the same name. Like ammonia, it forms crystallisable salts by direct combination with acids, those with mineral acids being soluble in alcohol (a distinction from ammonium salts). The vapour of trimethylamine, in contact with that of hydrochloric acid, forms a white cloud. When neutralised with acetic acid the aqueous solution gives a white precipitate with mercuric chloride. With iodine in solution of potassium iodide it yields a yellow precipitate; with tannic acid a whitish precipitate; with mercuric potassium iodide a white precipitate; and with phosphomolybdic acid a pale yellow precipitate. Its aqueous solution is also precipitated by potassium ferrocyanide. With gold chloride, it forms a double salt,  $\text{N}(\text{CH}_3)_3\text{HCl}, \text{AuCl}_3$ , which is sparingly soluble in cold water.

Trimethylamine is occasionally used in medicine, as the hydrochloride.

NOTE.—Liquor Trimethylaminæ, as found in commerce, contains 10 per cent. of trimethylamine, and has a specific gravity of 0.975.

**TRIMETHYLAMINÆ HYDROCHLORIDUM.**

TRIMETHYLAMINE HYDROCHLORIDE.



Trimethylamine hydrochloride,  $\text{N}(\text{CH}_3)_3\text{HCl}$ , may be prepared by neutralising trimethylamine with hydrochloric acid, and evaporating until crystals are formed. It may be freed from any ammonium chloride by means of absolute alcohol.

It occurs in the form of colourless, translucent prisms, deliquescent, having a slight fishy odour and a saline, pungent taste.

Very soluble in water and in alcohol; melting-point,  $274^{\circ}$  to  $275^{\circ}$ ; on heating to  $285^{\circ}$  it is decomposed, giving off trimethylamine and methyl chloride, and leaving mono- and di-methylamine hydrochlorides; at  $305^{\circ}$  ammonia and methyl chloride are given off from the residue, and at  $325^{\circ}$  the whole has completely volatilised. On a manufacturing scale this decomposition is utilised for the production of methyl chloride. It should be completely soluble in 10 parts of absolute alcohol (absence of ammonium chloride). On addition of alkalis, the free base, having a strong, ammoniacal, fishy odour, is liberated.

This compound was formerly given in gout and rheumatism, but is now rarely prescribed. When given internally, the odour and taste of trimethylamine hydrochloride may be partly disguised with peppermint water. It is sometimes ordered in pills, which may be massed with compound tragacanth powder and syrup of glucose.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

NOTE.—Trimethylamine hydrochloride is sometimes, but erroneously, called propylamine hydrochloride.

## TROCHISCI.

### LOZENGES.

Lozenges are prepared, so far as most of the official formulæ are concerned, by mixing the drug or a solution thereof with refined sugar and gum acacia, then making the mixture into a paste with mucilage of gum acacia, etc., dividing the mass into lozenges by means of a suitable apparatus and drying them in a hot-air chamber at a moderate temperature. The process varies somewhat according as the fruit, rose, simple, or tolu basis is employed, and the quantities specified in the following formulæ are for one hundred lozenges in each case.

#### Lozenges with Fruit Basis.

Refined Sugar, in fine powder	87.90 grammes (3.1 ounces)
Gum Acacia, in powder	3.90 grammes (60 grains)
Mucilage of Gum Acacia	7.10 mls (0.25 ounce)
Black Currant Paste of commerce	11.35 grammes (0.4 ounce)
Distilled Water, a sufficient quantity.	

Mix the drug intimately with the sugar and gum, then make the mixture into a paste with the mucilage and the black currant paste, previously softened with boiling distilled water, adding more water if necessary. Finally, divide into 100 equal lozenges, and dry.

#### Lozenges with Rose Basis.

Refined Sugar, in fine powder	99.20 grammes (3.5 ounces)
Gum Acacia, in powder	3.90 grammes (60 grains)
Mucilage of Gum Acacia	3.50 mls (1 fluid drachm)
Rose Water, a sufficient quantity.	

Mix the drug intimately with the sugar and gum; then make the mixture into a paste with the mucilage and rose water. Finally, divide into 100 equal lozenges, and dry.

#### Lozenges with Simple Basis.

Refined Sugar, in fine powder	99.20	grammes	(3.5 ounces)
Gum Acacia, in powder	3.90	grammes	(60 grains)
Mucilage of Gum Acacia	7.10	mils	(0.25 ounce)
Distilled Water, a sufficient quantity.			

Mix the drug intimately with the sugar and gum; then make the mixture into a paste with the mucilage and distilled water. Finally, divide into 100 equal lozenges, and dry.

#### Lozenges with Tolu Basis.

Refined Sugar, in fine powder	96.40	grammes	(3.4 ounces)
Gum Acacia, in powder	3.90	grammes	(60 grains)
Tincture of Balsam of Tolu	2.10	mils	(36 minims)
Mucilage of Gum Acacia	7.10	mils	(0.25 ounce)
Distilled Water, a sufficient quantity.			

Mix the drug intimately with the sugar and gum, previously dissolving any alkaloidal salt ordered in distilled water, 2.1 mils (36 minims); then add the tincture, and make the mixture into a paste with the mucilage, and any additional water required. Finally, divide into 100 equal lozenges, and dry.

#### Compressed Lozenges.

Compressed lozenges can be made by the method described in the case of *Tablettæ*, using theobroma emulsion prepared with gum acacia as excipient. The advantage of avoiding the application of heat is obvious in the case of volatile substances, such as phenol and essential oils, but strong pressure is necessary, especially for lozenges intended to dissolve slowly. When the lozenges are to be made with rose basis, rose water should be used in making the emulsion. Fruit basis can be satisfactorily incorporated by mixing with the emulsion, and melting together. Tincture of balsam or tolu should be triturated with the mixed powders before granulation.

### TROCHISCI ACIDI BENZOICI.

#### BENZOIC ACID LOZENGES.

Benzoic Acid	3.24	grammes	(50 grains)
Fruit Basis, a sufficient quantity.			

Mix, and divide into 100 lozenges.

Benzoic acid lozenges are used as a local antiseptic, and as a stimulant in pharyngeal affections. They are sometimes made with a red currant basis.

*Dose.*—1 to 5 lozenges.



**TROCHISCI ACIDI CARBOLICI.**

## CARBOLIC ACID LOZENGES.

*Synonym.*—Phenol Lozenges.

Carbolic Acid ... .. 6.48 grammes (100 grains)

Tolu Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

These lozenges are used as an antiseptic for the mouth and throat in tonsillitis, and ulcerated conditions.

*Dose.*—1 to 3 lozenges.

**TROCHISCI ACIDI TANNICI.**

## TANNIC ACID LOZENGES.

Tannic Acid ... .. 3.24 grammes (50 grains)

Fruit Basis, a sufficient quantity.

Mix and divide into 100 lozenges.

Tannic acid lozenges are used as an astringent in "sore throat."

*Dose.*—1 to 6 lozenges.

NOTE.—Trochisci Acidi Tannici, U.S.P., are prepared by mixing 6 grammes of tannic acid, 65 grammes of sugar, and 2 grammes of tragacanth with sufficient orange-flower water (undiluted) to form 100 lozenges.

**TROCHISCI ALTHÆÆ.**

## ALTHÆA LOZENGES.

*Synonym.*—Marshmallow Lozenges.

Althæa, in powder ... .. 7.50 grammes (115 grains)

Refined Sugar ... .. 97.00 grammes (1500 grains)

Gum Acacia ... .. 64.80 grammes (1000 grains)

Orange-flower Water, a sufficient quantity.

White of Egg, a sufficient quantity.

Macerate the althæa in a sufficient quantity of orange-flower water for twelve hours, strain, add the gum acacia and sugar. Dissolve and evaporate to the consistence of honey with constant stirring; gradually add the white of egg beaten up with more orange-flower water. Evaporate with stirring until the paste will not adhere to the hand, and divide into 100 lozenges.

These lozenges are used as a demulcent to allay cough.

**TROCHISCI AMMONII CHLORIDI.**

## AMMONIUM CHLORIDE LOZENGES.

Ammonium Chloride ... .. 12.96 grammes (200 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Ammonium chloride lozenges are used in pharyngeal catarrh. They act probably entirely after absorption.

*Dose.*—1 to 6 lozenges.

NOTE.—Trochisci Ammonii Chloridi, U.S.P., are prepared by mixing 10 grammes of ammonium chloride, 20 grammes of extract of liquorice, 2 grammes of tragacanth, and 40 grammes of sugar, with sufficient syrup of tolu to form 100 lozenges.

**TROCHISCI AMMONII CHLORIDI ET GLYCYRRHIZÆ.**

AMMONIUM CHLORIDE AND LIQUORICE LOZENGES.

Ammonium Chloride ... 19.44 grammes (300 grains)

Extract of Liquorice ... 19.44 grammes (300 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

These lozenges are used in pharyngeal catarrh.

*Dose.*—1 to 3 lozenges.**TROCHISCI ANTACIDI.**

ANTACID LOZENGES.

Precipitated Calcium Carbonate 22.75 grammes (350 grains)

Magnesium Carbonate ... 16.20 grammes (250 grains)

Sodium Chloride ... 6.50 grammes (100 grains)

Simple Basis, a sufficient quantity.

Mix and divide into 100 lozenges.

Antacid lozenges are used to diminish gastric acidity in flatulence.

*Dose.*—1 to 6 lozenges.*NOTE.*—The above is Sir W. Roberts' formula for antacid lozenges.**TROCHISCI BISMUTHI COMPOSITI.**

COMPOUND BISMUTH LOZENGES.

Bismuth Oxycarbonate ... 12.96 grammes (200 grains)

Heavy Magnesium Carbonate 12.96 grammes (200 grains)

Precipitated Calcium Carbonate 25.92 grammes (400 grains)

Rose Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Compound bismuth lozenges are used in pyrosis, gastric catarrh, and as an antacid.

*Dose.*—1 to 6 lozenges.**TROCHISCI BORACIS.**

BORAX LOZENGES.

Borax ... 19.44 grammes (300 grains)

Simple Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Borax lozenges are mildly detergent, for use in aphthous conditions of the mouth.

*Dose.*—1 to 3 lozenges.**TROCHISCI CATECHU.**

CATECHU LOZENGES.

Catechu ... 6.48 grammes (100 grains)

Simple Basis, a sufficient quantity.

Mix and divide into 100 lozenges.

Catechu lozenges are useful as a local astringent for the throat.

*Dose.*—1 to 6 lozenges.

NOTE.—Trochisci Gambir, U.S.P., are prepared by mixing 6 grammes of catechu, 65 grammes of sugar, and 2 grammes of tragacanth with sufficient orange-flower water (undiluted) to form 100 lozenges.

### TROCHISCI CATECHU COMPRESSI.

#### COMPRESSED CATECHU LOZENGES.

Catechu ... ..	6.48 grammes (100 grains)
Gum Acacia ... ..	7.75 grammes (120 grains)
Refined Sugar ... ..	99.00 grammes (3½ ounces)
Theobroma Emulsion (acacia), a sufficient quantity.	

Granulate, dry, and make into 100 lozenges.

These lozenges are used in inflamed and ulcerated throats.

Dose.—1 to 6 lozenges.

### TROCHISCI CHLORODYNI.

#### CHLORODYNE LOZENGES.

Morphine Hydrochloride ...	9.00 centigrams (1½ grains)
Tragacanth, in powder... ..	45.00 milligrams (¾ grain)
Chloroform ... ..	5.00 mls (77 minims)
Ether ... ..	0.75 mil (11½ minims)
Oil of Peppermint ... ..	1.00 centimil (0.2 minim)
Tincture of Capsicum... ..	1.00 decimil (1.75 minims)
Refined Sugar, a sufficient quantity.	
Mucilage of Acacia, sufficient	
to produce ... ..	156.00 grammes (5½ ounces)

Mix, and divide into 100 lozenges.

Chlorodyne lozenges are used to allay cough, and to relieve gastric pain and flatulence.

Dose.—1 to 3 lozenges.

### TROCHISCI CUBEÆ.

#### CUBEÆ LOZENGES.

Cubebs ... ..	3.24 grammes (50 grains)
Fruit Basis, a sufficient quantity.	

Mix, and divide into 100 lozenges.

Cubeb lozenges are used as a stimulant to the mucous membrane and to allay bronchial cough.

Dose.—1 to 6 lozenges.

NOTE.—Trochisci Cubeæ, U.S.P., are prepared by mixing 2 grammes of oleoresin of cubeb, 1 mil of oil of sassafras, 25 grammes of extract of liquorice, and 12 grammes of acacia with sufficient syrup of tolu to form 100 lozenges.

### TROCHISCI EUCALYPTI GUMMI.

#### EUCALYPTUS GUM LOZENGES.

*Synonyms.*—Trochisci Gummi Rubri; Red Gum Lozenges.

Eucalyptus Gum ... ..	6.48 grammes (100 grains)
Fruit Basis, a sufficient quantity.	

Mix, and divide into 100 lozenges.



Eucalyptus gum lozenges are used as an astringent for sore mouth and throat.

*Dose*.—1 to 6 lozenges.

### TROCHISCI FERRI REDACTI.

#### REDUCED IRON LOZENGES.

Reduced Iron ... .. 6.48 grammes (100 grains)

Simple Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

These lozenges are used as a means of giving reduced iron.

*Dose*.—1 to 6 lozenges.

### TROCHISCI GLYCYRRHIZÆ.

#### LIQUORICE LOZENGES.

*Synonym*.—Brompton Cough Lozenges.

Extract of Liquorice ... .. 19.50 grammes (300 grains)

Oil of Anise ... .. 3.00 mls (50 minims)

Simple Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

These lozenges are given to allay cough.

*NOTE*.—Trochisci Glycyrrhizæ et Opii, U.S.P., are prepared by mixing 15 grammes of extract of liquorice, 5 decigrams of opium, 12 grammes of acacia, 20 grammes of sugar, and 2 decimils of oil of anise, with sufficient water to produce 100 lozenges.

### TROCHISCI GUAIACI RESINÆ.

#### GUAIACUM RESIN LOZENGES.

Guaiacum Resin ... .. 19.44 grammes (300 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Guaiacum resin lozenges are used in chronic tonsilitis and pharyngitis, especially when these conditions are associated with rheumatism.

*Dose*.—1 to 6 lozenges.

### TROCHISCI IPECACUANHÆ.

#### IPECACUANHA LOZENGES.

Ipecacuanha Root, in powder... 1.62 grammes (25 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Ipecacuanha lozenges are used as an expectorant in cough. They act as an irritant to the stomach, causing a reflex effect on the bronchiolar secretion.

*Dose*.—1 to 3 lozenges.

**TROCHISCI KINO.****KINO LOZENGES.**

Kino ... .. 13.00 grammes (200 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Kino lozenges are used for their local astringent action.

*Dose*.—1 to 2 lozenges.

**TROCHISCI KRAMERIÆ.****KRAMERIA LOZENGES.**

*Synonym*.—Rhatany Lozenges.

Extract of Krameria ... .. 6.48 grammes (100 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Krameria lozenges are used as a local astringent in sore throat and stomatitis.

*Dose*.—1 to 3 lozenges.

*NOTE*.—Trochisci Krameria, U.S.P., are prepared by mixing 6 grammes of extract of krameria, 65 grammes of sugar, and 2 grammes of tragacanth with sufficient orange-flower water (undiluted) to form 100 lozenges.

**TROCHISCI KRAMERIÆ COMPRESSI.****COMPRESSED KRAMERIA LOZENGES.**

Extract of Krameria ... .. 6.50 grammes (100 grains)

Gum Acacia ... .. 7.75 grammes (120 grains)

Black Currant Paste of Commerce ... .. 11.50 grammes (175 grains)

Refined Sugar ... .. 88.00 grammes (3 $\frac{1}{10}$  ounces)

Theobroma Emulsion (acacia), 5.50 grammes (87 $\frac{1}{2}$  grains),  
or a sufficient quantity

Incorporate the fruit paste with the theobroma emulsion by heating together on a water-bath, granulate, dry, and make into 100 lozenges.

These compressed lozenges are used similarly to ordinary krameria lozenges.

*Dose*.—1 to 3 lozenges.

**TROCHISCI KRAMERIÆ ET COCAINÆ.****KRAMERIA AND COCAINE LOZENGES.**

*Synonym*.—Rhatany and Cocaine Lozenges.

Extract of Krameria ... .. 6.48 grammes (100 grains)

Cocaine Hydrochloride ... .. 0.324 gramme ( 5 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Krameria and cocaine lozenges are used to relieve irritable cough, the cocaine acting as a local anæsthetic.

*Dose*.—1 to 3 lozenges.

**TROCHISCI LINI ET GLYCYRRHIZÆ ET CHLORODYNI.**

LINSEED, LIQUORICE, AND CHLORODYNE LOZENGES.

Chlorodyne ... .. 10.00 mils ( $2\frac{1}{2}$  fluid drachms)Extract of Liquorice ... .. 14.00 grammes ( $\frac{1}{2}$  ounce)Mucilage of Linseed ... .. 2.00 mils ( $\frac{1}{2}$  fluid drachm)

Mucilage of Gum Acacia, a sufficient quantity.

Refined Sugar, sufficient to

produce ... .. 156.00 grammes ( $5\frac{1}{2}$  ounces)

Mix, and divide into 100 lozenges.

Linseed, liquorice, and chlorodyne lozenges are used to allay cough.

*Dose.*—1 to 6 lozenges.**TROCHISCI MENTHOLIS COMPOSITI.**

COMPOUND MENTHOL LOZENGES.

Potassium Chlorate ... .. 4.50 grammes (70 grains)

Menthol ... .. 1.50 gramme (23 grains)

Betacaine Hydrochloride ... .. 0.20 gramme (3 grains)

Fruit Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Compound menthol lozenges are used in catarrh and in ulcerated and inflamed conditions of the buccal mucous membrane.

*Dose.*—1 to 3 lozenges.**TROCHISCI MORPHINÆ.**

MORPHINE LOZENGES.

Morphine Hydrochloride ... .. 0.18 gramme (2.77 grains)

Tolu Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Morphine lozenges are used as a sedative in cough. They act after absorption.

*Dose.*—1 to 6 lozenges.**TROCHISCI MORPHINÆ ET IPECACUANHÆ.**

MORPHINE AND IPECACUANHA LOZENGES.

Morphine Hydrochloride ... .. 0.18 gramme (2.77 grains)

Ipecacuanha, in powder ... .. 0.54 gramme (8.33 grains)

Tolu Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Morphine and ipecacuanha are used as a sedative and expectorant in cough.

*Dose.*—1 to 6 lozenges.



**TROCHISCI MORPHINÆ ET IPECACUANHÆ COMPRESSI.**

COMPRESSED MORPHINE AND IPECACUANHA LOZENGES.

Morphine Hydrochloride	...	18.00 milligrams	( $2\frac{4}{5}$ grains)
Ipecacuanha, in powder	...	0.55 gramme	( $8\frac{1}{2}$ grains)
Gum Acacia	... ..	7.75 grammes	(120 grains)
Refined Sugar	... ..	96.50 grammes	( $3\frac{1}{2}$ ounces)
Tincture of Balsam of Tolu	...	24.00 decimils	(36 minims)
Theobroma Emulsion (acacia), a sufficient quantity.			

Mix the powders, then incorporate the tincture of balsam of tolu by trituration, granulate, dry, and make into 100 lozenges.

They are used similarly to morphine and ipecacuanha lozenges.

*Dose.*—1 to 6 lozenges.

**TROCHISCI OPII.**

OPIUM LOZENGES.

Extract of Opium	... ..	0.648 gramme	(10 grains)
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Tolu Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Opium lozenges are used as a sedative for coughs.

*Dose.*—1 to 3 lozenges.

**TROCHISCI PHENOLPHTHALEINI.**

PHENOL-PHTHALEIN LOZENGES.

Phenol-phthalein	... ..	13.00 grammes	(200 grains)
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Chocolate, a sufficient quantity.

Mix, and divide into 100 lozenges.

Phenol-phthalein lozenges are used as a purgative.

*Dose.*—1 to 3 lozenges.

**TROCHISCI POTASSII CHLORATIS.**

POTASSIUM CHLORATE LOZENGES.

Potassium Chlorate	... ..	19.44 grammes	(300 grains)
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Rose Basis, a sufficient quantity.

Mix, and divide into 100 lozenges.

Potassium chlorate lozenges are used in stomatitis and generally in inflammatory conditions of the mouth and throat.

*Dose.*—1 to 6 lozenges.

NOTE.—Trochisci Potassii Chloratis, U.S.P., are prepared by mixing 15 grammes of potassium chlorate, 60 grammes of sugar, and 3 grammes of tragacanth, with sufficient water to form 100 lozenges.

**TROCHISCI POTASSII CHLORATIS COMPRESSI.**

## COMPRESSED POTASSIUM CHLORATE LOZENGES.

Potassium Chlorate	...	...	19.50 grammes (300 grains)
Gum Acacia	...	...	5.75 grammes (90 grains)
Refined Sugar	...	...	99.00 grammes (3½ ounces)
Theobroma Emulsion (made with acacia and rose water), a sufficient quantity.			

Granulate, dry, and make into 100 lozenges.

They are used similarly to potassium chlorate lozenges.

*Dose.*—1 to 6 lozenges.

**TROCHISCI SANTONINI.**

## SANTONIN LOZENGES.

Santonin	...	...	6.48 grammes (100 grains)
Simple Basis, a sufficient quantity.			

Mix, and divide into 100 lozenges.

Santonin lozenges are given to children to expel round worms and thread worms. They should be followed by a dose of castor oil.

*Dose.*—1 to 5 lozenges.

**NOTE.**—Trochisci Santonini, U.S.P., are prepared by mixing 3 grammes of santonin, 90 grammes of sugar, and 3 grammes of tragacanth, with sufficient orange-flower water (undiluted) to form 100 lozenges.

**TROCHISCI. SODII BICARBONATIS.**

## SODIUM BICARBONATE LOZENGES.

Sodium Bicarbonate	...	...	19.44 grammes (300 grains)
Rose Basis, a sufficient quantity.			

Mix, and divide into 100 lozenges.

They are used as an antacid in dyspepsia and flatulence.

*Dose.*—1 to 6 lozenges.

**NOTE.**—Trochisci Sodii Bicarbonatis, U.S.P., are prepared by mixing 18 grammes of sodium bicarbonate, 54 grammes of sugar, and 1 gramme of nutmeg, with sufficient mucilage of tragacanth to form 100 lozenges.

**TROCHISCI SULPHURIS.**

## SULPHUR LOZENGES.

Precipitated Sulphur	...	...	32.40 grammes (500 grains)
Acid Potassium Tartrate, in powder	...	...	6.48 grammes (100 grains)
Refined Sugar, in powder	...	...	51.84 grammes (800 grains)
Gum Acacia, in powder	...	...	6.48 grammes (100 grains)
Tincture of Orange	...	...	5.90 mls (100 minims)
Mucilage of Gum Acacia	...	...	5.90 mls (100 minims)

Mix the powders; add the tincture and make into a suitable mass with the mucilage; divide into 100 lozenges; finally dry them in a hot-air chamber at a moderate temperature.

¶ Sulphur lozenges are used as a mild laxative in rheumatism, gout, chronic skin diseases, etc.

*Dose*—1 to 6 lozenges.

NOTE.—Dr. Garrod's original formula for sulphur lozenges ordered 4 grains of precipitated sulphur, 1 grain of acid potassium tartrate, and a sufficient quantity of refined sugar, in each lozenge.

## TRYPSINUM.

### TRYPSIN.

Trypsin is a proteolytic enzyme, or ferment, formed from the zymogen, trypsinogen, secreted by the pancreas. It may be isolated in a state of comparative purity by bruising the fresh and healthy pancreas of the hog, *Sus scrofa*, Linn. (N.O. Ungulata), freed from fat, digesting in a 0.1 per cent. solution of salicylic acid for four hours at 40°, then in a 0.25 per cent. sodium carbonate solution containing thymol for twelve hours. The acid and alkaline extracts are mixed, and the amount of thymol brought up to 0.5 per cent. The total amount of sodium carbonate is brought up to the same percentage and the mixture digested for a week, then cooled, and allowed to stand for twenty-four hours and filtered from the tyrosin which has crystallised out. It is then neutralised with acetic acid and saturated with ammonium sulphate, which precipitates the trypsin. This is collected and washed with saturated solution of ammonium sulphate. If this process is followed with cleanliness and care no trypsin is produced, but only its zymogen, trypsinogen. The addition of a trace of filtered aqueous extract of duodenum at once converts the trypsinogen into trypsin by virtue of another ferment, enterokinase, which it contains. This process does not yield a trypsin free from amylolytic power, nor is any commercial trypsin powder free from amylopsin.

It occurs in the form of a whitish or yellowish powder, having a pepsin-like odour. Very soluble in water, insoluble in alcohol or pure glycerin. It acts with great rapidity on soluble proteins, such as the casein of milk, but slowly on coagulated egg-albumen. The action is best promoted in alkaline solution of the strength of 0.2 to 0.5 per cent. of sodium carbonate, though it also exercises its properties in neutral or even faintly acid solution. Its activity, however, ceases at once in a medium having the degree of acidity favourable to peptic action. It is particularly active towards fibrin and muscular tissue, which it dissolves in great quantity. The fibrin does not become swollen or translucent as in the case of pepsin digestion, but is gradually corroded rather than dissolved, so that the digestive fluid is always turbid from the presence of granular debris. The temperature most favourable to the action lies between 37° and 40°, continuing up to 50°, but above the latter temperature it rapidly diminishes, and ceases altogether at 75°. The



ferment, when in the perfectly dry state, however, does not lose its activity even after heating to  $100^{\circ}$ . Its action is destroyed by 0.1 per cent. of hydrochloric acid, impeded by 0.5 per cent. of acetic acid, and totally inhibited by 0.05 per cent. of lactic acid. Pure trypsin has no action on starch or dextrose.

The products of the action of trypsin on proteins are peptones, which, in the presence of the peptone-splitting ferments, are rapidly decomposed into the crystalline bodies leucine and tyrosin, smaller quantities of aspartic acid, glutamic acid, lysine, arginine, ammonia, and tryptophan, a substance which gives a reddish-violet colour with chlorine or bromine water. When boiled, trypsin yields about 20 per cent. of albumen and 80 per cent. of peptone (antipeptone). The aqueous solution is not destroyed by long digestion at  $40^{\circ}$ , and when evaporated it yields a translucent, non-crystalline, yellowish, solid residue. It should peptonise about 100 parts of coagulated egg-albumen in about an hour and a-half. The digestive power may also be determined by submitting capillary tubes filled with stained (methyl violet) gelatin to its action, and measuring the length dissolved in a given time. The digestive power is proportional to the square root of the concentration, except for strong solutions, when it is less. Good samples have nearly twice the proteolytic strength of Pancreatinum, U.S.P., when tested with milk proteid.

Commercial trypsin contains a variable proportion of amylopsin and inert matter. It is used internally and externally for its digestive action on proteid material. The ferment is destroyed by the gastric juice, and for internal use it is therefore best administered in capsules prepared to resist gastric digestion. When given in liquid form it is administered in alkaline solution two or three hours after a meal—*i.e.*, at the period of lowest gastric acidity (see also under Pancreatinum). Externally a 5 to 10 per cent. cream or solution in dilute glycerin made alkaline with sodium bicarbonate is used as an application to malignant and other ulcerations. Douches, pessaries, and suppositories (5 to 10 per cent.), are used in uterine and rectal cancer. Recently, a specific action in malignant disease has been attributed to trypsin and the mixed pancreatic ferments, on the assumption that the cancerous state is the result of prolonged pancreatic deficiency; the most recent evidence of a reliable nature has shown that it is of no greater value than the other host of "cures." Some forms of diabetes are known to arise from inefficient performance of the functions of the pancreas, and extirpation of that organ results in the production of glycosuria, wasting, and a fatal toxæmia. Trypsin has therefore been used by hypodermic injection as well as by the other modes of administration described, the injections being made into cellular tissue in any suitable situation. It is well known, however, that the glycolitic functions of the pancreas are associated, not with the organ as a digestive gland, but with the special cells found in the islets of Langerhans. The treatment of pancreatic diabetes by

trypsin, or by preparations of the special portion of the gland indicated, has not, however, proved successful.

*Dose.*—2 to 6 decigrams (3 to 10 grains).

NOTES.—The terms trypsin and pancreatin are sometimes used synonymously, but the latter is more correctly applied to the mixture of pancreatic ferments (see Pancreatinum) of which trypsin, the proteolytic enzyme, is one. The pancreatic secretion also contains the proteolytic and peptone-splitting ferment erepsin, an enzyme found also in the kidney, intestinal mucous membrane, lung, spleen, liver, and other animal organs and tissues. The deficiency of this ferment, as well as of trypsin, has been assumed in malignant disease. The ferments obtained from fresh liver juice have been stated to exercise a disintegrating action on carcinomatous tissue.

## TUBERCULINUM.

### TUBERCULIN.

*Synonym.*—Old Tuberculin.

Tuberculin is a glycerin extract of the soluble substances produced by the *Bacillus tuberculosis* in a glycerin-veal bouillon. The cultures, bacilli and broth, are concentrated over a water-bath to about one-tenth, and filtered through porcelain to remove the bacilli.

It occurs as an amber-coloured, syrupy liquid, having a characteristic odour, and giving the reactions for glycerin and albumoses. It should be kept in a cool, dark place.

This tuberculin was originally introduced as a curative agent in the treatment of tuberculosis, but was abandoned for this purpose on account of unfavourable symptoms following its use in the large doses employed. At the present time it is extensively employed as a diagnostic agent for tubercle, its use in this respect being nearly infallible. It produces a characteristic, febrile reaction in tuberculous patients, and in cattle, but not in those uninfected by the germ.

*Adult Diagnostic Dose*, 1 microl ( $\frac{1}{1000}$  mil), subcutaneously, followed after two days, if necessary, by 2 microls, and in the absence of reaction by 4 microls after a similar interval. If no reaction follow the latter dose the patient is probably free from tuberculous disease. For diagnosing tuberculosis in cattle the dose is 1 to 5 decimils, the latter dose being for a full-grown ox. The dilutions may be made with 0.5 per cent. carbolic acid solution; they should be freshly prepared.

NOTES.—Tuberculin is official in the German Pharmacopœia as Tuberculinum Kochii. Mallein is a preparation analogous to the "old" tuberculin, and prepared in a similar way, the glanders bacillus (*B. mallei*) taking the place of the tubercle bacillus. It is used chiefly for the diagnosis of glanders in horses, and is scarcely ever used for human patients.

## TUBERCULINUM NOVUM.

### NEW TUBERCULIN.

*Synonyms.*—Tuberculin R.; Tuberculin T.R.

New tuberculin, or tuberculin R., is prepared from virulent cultures of the tubercle bacillus by growing the bacilli on glycerin

serum, scraping off the resulting growth, heating to 60° to kill the bacilli, desiccating *in vacuo*, and triturating. The triturated mass is emulsified in distilled water, the emulsion centrifugalised, the upper layer, which is slightly opalescent, is rejected, and the residue of powdered bacilli again dried, triturated, emulsified, and centrifugalised. The upper layer this time is new tuberculin. On similarly treating the residue again, a second fraction is obtained, and so, likewise, further fractions until the residue is finally used up. The fluids are then mixed, and the strength of the liquid adjusted so that it contains 10 milligrams of solid substance in 1 mil, 20 per cent. of glycerin being added for preservative purposes.

It occurs as an opalescent liquid, having an appearance like that produced by mixing 5 or 6 drops of milk with  $\frac{1}{2}$  ounce of water.

This tuberculin is used only for treatment, not for diagnostic purposes, and in some cases marked benefit has followed its employment. It acts by increasing the activity of the phagocytes for the destruction of tubercle bacilli. But these positive stages are always preceded by negative stages in which the activity of the phagocytes is diminished. The negative phase may be greatly prolonged in the case of tuberculous patients.

*Dose*, commencing,  $\frac{1}{8000}$  to  $\frac{1}{1000}$  milligram of the solid substance, administered subcutaneously. For use it is diluted with a 20 per cent. sterilised glycerin solution in water, or with sterilised physiological salt solution, the equivalent of the  $\frac{1}{1000}$  milligram being 0.1 mil of a 1 in 1000 dilution.

NOTES.—Solutions of new tuberculin should be freshly prepared. Since the introduction by Sir A. E. Wright of the method of determining the "opsonic index," the reaction to "new tuberculin" can be gauged, and the administration of large doses has been abandoned.

## TURPETHUM.

### TURPETH.

Turpeth consists of the dried root and stem of *Ipomœa Turpethum*, R. Br. (N.O. Convolvulacæ), a native of India and Ceylon.

The drug occurs in cylindrical pieces from 1.5 to 5 centimetres in diameter, the central woody portion being often removed by splitting the bark on one side. Externally the pieces are of a greyish-brown colour and deeply furrowed longitudinally. The fracture is short, a transverse section in which the central portion has not been removed exhibits an outer cortical portion and a central woody column containing large wood vessels. The drug has but a faint odour and taste.

The chief constituent is about 10 per cent. of a grey resin, insoluble in ether, called turpethin, which resembles jalapin (convolvulin). The drug also contains a small quantity of an ether-soluble resin, and traces of volatile oil and fatty matter.

Turpeth has properties resembling those of jalap, but is rather



less powerful and slower in its action. It is official in India and the Eastern Colonies for use in place of jalap.

*Dose*.—1 to 4 grammes (15 to 60 grains).

## TUSSILAGINIS FLORES.

COLTSFOOT FLOWERS.

*Synonym*.—Farfaræ Flores.

Coltsfoot flowers consist of the dried flowering stems of the common coltsfoot, *Tussilago farfara*, Linn. (N.O. Compositæ).

The flowers of the coltsfoot appear in the early spring. The peduncles are simple, bear numerous reddish bracts, and whitish hairs terminating in small, dark red glands. The flower heads are terminal and possess numerous ray florets with very narrow, bright yellow, ligulate corollas; the fruits are provided with an abundant pappus of white simple hairs. No characteristic odour or taste.

The flowering stems probably contain constituents similar to those of the leaves, and are employed in the preparation of Syrupus Tussilaginis.

## TUSSILAGINIS FOLIA.

COLTSFOOT LEAVES.

*Synonym*.—Farfaræ Folia.

Coltsfoot leaves are obtained from the common coltsfoot, *Tussilago farfara*, Linn. (N.O. Compositæ), and dried before use.

The leaves are cordate in shape, petiolate, usually 10 to 15 centimetres wide, though attaining 25 centimetres. Margin sinuate-dentate, each tooth terminating in a hard, brown point. Upper surface greyish-green, wrinkled; under surface covered with loose, white, felted hairs. No characteristic odour or taste.

The leaves contain mucilage, tannin, and a trace of a bitter glucoside.

Coltsfoot leaves are used as a demulcent to relieve chronic and irritable cough. A decoction (1 in 20) is prepared which is taken in doses of a wineglassful or more several times daily. The leaves are also an ingredient of herb tobaccos. "Coltsfoot rock" is a domestic remedy for pulmonary complaints.

*NOTE*.—The leaves of the butterbur, *Tussilago petasites*, Linn., closely resemble coltsfoot leaves, but may be distinguished by their more rounded outline, larger size, and less sinuate margin.

## TYLOPHORÆ FOLIA.

TYLOPHORA LEAVES.

Tylophora leaves are obtained from *Tylophora asthmatica*, Wight and Arnott (N.O. Asclepiadæ), a twining shrub growing in India, Ceylon, and the Moluccas. The leaves are collected and dried.

The leaves are yellowish-brown in colour, 5 to 12·5 centimetres long, and 18 to 65 millimetres broad. They are broadly ovate, and usually cordate at the base. The apex is shortly acuminate, and the margin entire. The upper surface is glabrous, but the lower bears slender, 3 to 5-celled hairs. The leaves, which are somewhat tough, have but slight odour or taste.

The chief constituent of tylophora leaves is a crystallisable alkaloid, tylophorine, soluble in ether; the leaves are also said to contain an emetic principle and about 15 per cent. of mineral matter.

Tylophora leaves are official in India and the Eastern Colonies for use as an expectorant and emetic in place of ipecacuanha.

*Dose*.—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains); as an emetic, 1 to 2 grammes (15 to 30 grains).

### ULMI CORTEX.

#### ELM BARK.

Elm bark is obtained from the common elm, *Ulmus campestris*, Linn. (N.O. Urticaceæ), freed from the dark, outer portion.

Rather thick, flattened pieces, usually 10 to 15 centimetres long and 2·5 to 5 centimetres wide, consisting of secondary bast. Outer surface pale, yellowish-brown, marked with patches of the dark brown, outer portion; inner surface longitudinally striated. Fracture rather tough and short but not very fibrous. Inodorous; taste astringent and slightly mucilaginous.

The chief constituent of elm bark is tannin; it also contains starch and a little mucilage.

Elm bark is a bitter and astringent. The decoction is given internally in intestinal catarrh and diarrhœa, and has been used as an injection in leucorrhœa.

### ULMI FULVÆ.

#### SLIPPERY ELM.

*Synonyms*.—Ulmis; Elm.

Slippery elm is the dried bark of the slippery elm, *Ulmus fulva*, Michaux (N.O. Urticaceæ), deprived of the dark outer portion.

The bark usually occurs in large strips several decimetres in length, but only about 3 millimetres thick, consisting of secondary bast. Outer surface reddish-yellow, with patches of the brown outer portion, longitudinally striated; inner surface tawny yellow. Extremely tough and fibrous. The transverse section is minutely chequered and, after moistening, exhibits numerous cells filled with transparent, swollen mucilage. Odour strong, resembling fœnugreek; taste very mucilaginous.

The chief constituent of slippery elm bark is mucilage, of which it contains so much that 10 grains of the powdered bark will convert a fluid ounce of water into a thick jelly. It also contains a little tannin.

Slippery elm bark is used chiefly as a demulcent in catarrhal affections of the intestine and urinary tract, diarrhœa, dysentery, etc. The powdered bark is sometimes mixed with hot water to form a poultice. Mucilago Ulmi Fulvæ is also prepared and given freely diluted.

## UNGUENTA PRO OCULIS.

### EYE OINTMENTS.

Eye ointments are made with soft paraffin, of uniform consistence, free from granular particles, and having a melting-point of about  $35^{\circ}$ , so that the ointments melt readily when introduced into the eye. The soft paraffin should be first carefully examined to ensure its neutrality, then melted, strained through fine muslin, and set aside in a covered vessel to cool. The material to be incorporated in the ointments should be in the finest possible powder, and should be triturated with a small portion of the soft paraffin until a perfectly smooth mixture is obtained. In the alkaloidal ointments the pure alkaloids are used and the mixture of alkaloids and paraffin may be warmed just above the melting-point of the latter (not above  $50^{\circ}$ ) until solution is effected. The salts of alkaloids are mostly insoluble in fats. The use of oleic acid as a solvent for alkaloids in eye ointments is not desirable, as many samples of oleic acid are rancid and have an irritant action. The finished ointments should be preserved in covered pots, and the introduction of foreign matter, on the spatula or otherwise, carefully avoided. Eye ointments are best applied by means of a glass rod that can be thoroughly cleansed before and after use. The following eye ointments are those which are most frequently employed (4·375 grains per ounce = 1 per cent.):—

#### **Unguentum Acidi Borici Dilutum.** DILUTED BORIC ACID OINTMENT.

Boric Acid	...	...	...	...	4 per cent.
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#### **Unguentum Atropinæ Dilutum.** DILUTED ATROPINE OINTMENT.

Atropine	...	...	...	...	1 per cent.
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#### **Unguentum Atropinæ cum Cocaina.** ATROPINE OINTMENT WITH COCAINE.

Atropine	...	...	...	...	1 per cent.
Cocaine	...	...	...	...	2 per cent.

#### **Unguentum Cocainæ Dilutum.** DILUTED COCAINE OINTMENT.

Cocaine	...	...	...	...	2 per cent.
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#### **Unguentum Flavum.** YELLOW OINTMENT.

Yellow Mercuric Oxide	...	...	...	1 per cent.
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#### **Unguentum Flavum cum Atropina.** YELLOW OINTMENT WITH ATROPINE.

Yellow Mercuric Oxide	...	...	...	1 per cent.
Atropine	...	...	...	0·5 per cent.



**Unguentum Hydrargyri Ammoniatum Dilutum.** DILUTED AMMONIATED MERCURY OINTMENT.

Ammoniated Mercury ... .. i per cent.

**Unguentum Iodoformi cum Atropina.** IODOFORM OINTMENT WITH ATROPINE.

Precipitated Iodoform ... .. 10 per cent.

Atropine ... .. 0·5 per cent.

**Unguentum Iodoformi Præcipitati.** PRECIPITATED IODOFORM OINTMENT.

Precipitated Iodoform ... .. 10 per cent.

**UNGUENTUM ACIDI BORICI.**

## BORIC ACID OINTMENT.

Boric Acid, in very fine powder ... .. 10·00

Paraffin Ointment, white ... .. 90·00

Mix the boric acid with the paraffin ointment.

Boric acid ointment is employed as an antiseptic and emollient, and applied thickly on lint or linen as a dressing for surface wounds. It is of such a consistency that when removed it adheres to the dressing, not to the skin.

NOTES.—The above preparation is sometimes prescribed as Unguentum Boracicum; it should not be confused with Unguentum Boracis. Unguentum Acidi Borici, U.S.P., is prepared by adding 10 of boric acid to a mixture of 10 of hard paraffin and 80 of white, soft paraffin.

**UNGUENTUM ACIDI CARBOLICI.**

## CARBOLIC ACID OINTMENT.

Synonyms.—Unguentum Phenolis; Phenol Ointment.

Carbolic Acid ... .. 4·00

Glycerin, by weight ... .. 12·00

Paraffin Ointment, white ... .. 84·00

Mix the paraffin ointment with the carbolic acid, after dissolving the latter in the glycerin.

Carbolic acid ointment is used similarly to boric acid ointment, but is somewhat more irritant. It is applied in parasitic skin diseases, infected ulcers, etc.

NOTES.—It has been stated that a more satisfactory preparation can be made by melting 24 of hard paraffin with 72 of soft paraffin, and dissolving 4 of carbolic acid in the mixture. Unguentum Phenolis, U.S.P., is prepared by mixing 3 of carbolic acid with 97 of white, soft paraffin.

**UNGUENTUM ACIDI CARBOLICI COMPOSITUM.****COMPOUND CARBOLIC ACID OINTMENT.***Synonym.*—Compound Phenol Ointment.

Mercuric Nitrate Ointment	...	...	...	40'00
Sublimed Sulphur	...	...	...	10'00
Carbolic Acid	...	...	...	20'00
Olive Oil, by weight	...	...	...	20'00
Yellow Beeswax	...	...	...	20'00

Heat the olive oil on a water-bath, add the sulphur gradually, and stir until they are uniformly blended; dissolve the beeswax in the mixture, stir while cooling, and when nearly cold add the carbolic acid and stir until dissolved. Rub the mercuric nitrate ointment in a mortar until smooth, then incorporate with it the mixture previously prepared.

This ointment is used as a parasiticide and, generally diluted, as a stimulating antiseptic in chronic eczema and psoriasis.

**UNGUENTUM ACIDI PYROGALLICI.****PYROGALLIC ACID OINTMENT.***Synonyms.*—Pyrogallol Ointment; Jarisch's Ointment.

Pyrogallic Acid	...	...	...	12'00
Lard	...	...	...	88'00

Mix the pyrogallic acid with the lard.

Pyrogallic acid ointment is used in psoriasis. It is frequently reduced in strength by mixing with 1 to 5 parts of lard or soft paraffin. It should be used with caution, and should not be applied to large areas on account of the danger of absorption.

**UNGUENTUM ACIDI PYROGALLICI COMPOSITUM.****COMPOUND PYROGALLIC ACID OINTMENT.***Synonym.*—Unna's Compound Pyrogallol Ointment.

Pyrogallic Acid	...	...	...	5'00
Ammonium Ichthosulphonate	...	...	...	5'00
Salicylic Acid	...	...	...	2'00
Soft Paraffin	...	...	...	88'00

Mix the pyrogallic and salicylic acids with the ammonium ichthosulphonate and soft paraffin.

This ointment is used chiefly in psoriasis and chronic eczema. It should not be applied over large surfaces, on account of the danger of absorption.

**UNGUENTUM ACIDI SALICYLICI.****SALICYLIC ACID OINTMENT.**

Salicylic Acid, in powder	...	...	...	2'00
Paraffin Ointment, white	...	...	...	98'00

Mix the salicylic acid with the paraffin ointment.

Salicylic acid ointment is used as an application to the skin in chronic eczema, acne, etc.; it is also used, applied thickly on lint, as a dressing for ulcerated wounds.

### UNGUENTUM ACIDI TANNICI.

#### TANNIC ACID OINTMENT.

Tannic Acid	...	...	...	...	20'00
Glycerin, by weight	...	...	...	...	20'00
Simple Ointment	...	...	...	...	60'00

Dissolve the tannic acid in the glycerin, with the aid of gentle heat, and mix the solution intimately with the ointment in a mortar.

Tannic acid ointment is used for hæmorrhoids, chronic vaginitis, and sluggish ulcers.

NOTE.—This preparation corresponds to Unguentum Acidi Tannici, U.S.P.

### UNGUENTUM ACONITINÆ.

#### ACONITINE OINTMENT.

Aconitine	...	...	...	...	2'00
Oleic Acid, by weight	...	...	...	...	16'00
Lard	...	...	...	...	82'00

Mix the aconitine with the oleic acid, warm gently until dissolved, and incorporate the lard.

Aconitine ointment is used to relieve neuralgic pain, especially in the face; it is also used to allay the pain of sciatica and acute rheumatism. It must not be brought into contact with mucous membranes or with abraded surfaces.

### UNGUENTUM ADIPIS LANÆ.

#### WOOL FAT OINTMENT.

*Synonym.*—Unguentum Lanolini; Lanolin Ointment.

Hydrous Wool Fat	...	...	...	...	90'00
Olive Oil	...	...	...	...	10'00

Mix the olive oil with the hydrous wool fat.

Wool fat ointment is used as an emollient, and as a basis for the application of drugs to the skin.

NOTE.—Unguentum Adipis Lanæ of the German Pharmacopœia is prepared with 20 of wool fat, 5 of water, and 5 by weight of olive oil.

### UNGUENTUM ADRENINÆ.

#### ADRENINE OINTMENT.

Adrenine	...	...	...	...	0'10
Boric Acid	...	...	...	...	0'20
Distilled Water	...	...	...	...	3'00
Hydrous Wool Fat	...	...	...	...	50'00
Soft Paraffin, yellow, sufficient to produce	...	...	...	...	100'00

Dissolve the boric acid and adrenine in the water, add the



hydrous wool fat, and make up the required weight with soft paraffin.

This ointment is of a suitable strength for use in hæmorrhoids. For application to the nasal mucous membrane in coryza the milder ointment is preferred.

NOTE.—This preparation contains 1 in 1000 of adrenaline.

### UNGUENTUM ADRENINÆ ALBUM.

#### WHITE ADRENINE OINTMENT.

Adrenaline...	...	...	...	...	0·10
Castor Oil	...	...	...	...	5·00
Absolute Alcohol	...	...	...	...	2·00
Hydrochloric Acid, a sufficient quantity.					
Soft Paraffin, white, sufficient to produce	...	...	...	...	100·00

Mix the adrenaline with the absolute alcohol, and add just sufficient hydrochloric acid to dissolve it, applying the acid by means of a glass rod, which is dipped alternately into the acid and alcohol, and shaking the mixture after each addition of acid. When solution of the adrenaline is complete, mix the liquid with the castor oil, and add the soft paraffin.

This ointment may be used for similar purposes to Unguentum Adreninæ.

NOTE.—This preparation contains 1 in 1000 of adrenaline.

### UNGUENTUM ADRENINÆ ET COCAINÆ.

#### ADRENINE AND COCAINE OINTMENT.

Adrenaline ...	...	...	...	...	0·10
Boric Acid	...	...	...	...	0·20
Cocaine Hydrochloride	...	...	...	...	1·00
Distilled Water	...	...	...	...	3·00
Hydrous Wool Fat	...	...	...	...	50·00
Soft Paraffin, yellow, sufficient to produce	...	...	...	...	100·00

Dissolve the adrenaline, boric acid, and cocaine hydrochloride in the distilled water, and mix with the hydrous wool fat and soft paraffin.

This ointment is an effective application for inflamed piles; it is best applied by means of a rectal introducer.

NOTE.—This preparation contains 1 in 1000 of adrenaline and 1 per cent. of cocaine hydrochloride.

### UNGUENTUM ADRENINÆ MITIS.

#### MILD ADRENINE OINTMENT.

Adrenaline Ointment	...	...	...	...	20·00
Oil of Rose	...	...	...	...	0·10
Soft Paraffin, white, sufficient to produce	...	...	...	...	100·00

Mix the oil of rose with the adrenaline ointment, and add the soft paraffin.

This ointment may be applied to the nasal mucous membrane with a brush in acute coryza.

NOTE.—This preparation contains 1 in 5000 of adrenaline.

## UNGUENTUM ANTIMONII TARTARATI.

### TARTARATED ANTIMONY OINTMENT.

Tartarated Antimony, in fine powder...	...	20'00
Simple Ointment	... ..	80'00

Mix the tartarated antimony with the simple ointment.

This ointment was formerly employed as a counter-irritant to neuralgic areas, swollen joints, and the chest in lung affections; it is now rarely prescribed.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

## UNGUENTUM AQUÆ ROSÆ.

### ROSE WATER OINTMENT.

*Synonym.*—Unguentum Refrigerans.

Rose Water, undiluted	... ..	42'00
White Beeswax...	... ..	9'00
Spermaceti	... ..	9'00
Almond Oil, by weight...	... ..	54'00
Oil of Rose	... ..	0'10

Add the rose water gradually, and with constant stirring, to the previously melted beeswax, spermaceti, and almond oil in a warm mortar; then add the oil of rose, and continue the stirring until cold.

Rose water ointment is used as an emollient for the skin and as a basis for other ointments.

NOTES.—A superior preparation can be obtained by using only 25 of rose water; the quantity ordered in the above formula is too large to be capable of thorough incorporation with the fats, and frequently separates out. When required for toilet purposes Ceratum Galeni should be used. Unguentum Aquæ Rosæ, U.S.P., is prepared with 12½ of spermaceti, 12 of white wax, 56 of almond oil, ½ of borax, and 19 of rose water (undiluted).

## UNGUENTUM ATROPINÆ.

### ATROPINE OINTMENT.

Atropine ...	... ..	2'00
Oleic Acid, by weight	... ..	8'00
Lard	... ..	90'00

Mix the atropine with the oleic acid, warm gently until dissolved, and incorporate the lard.

Atropine ointment is applied to relieve neuralgic pain. For an ointment for ophthalmic use see "Unguenta pro Oculis."

**UNGUENTUM BELLADONNÆ.****BELLADONNA OINTMENT.**

Liquid Extract of Belladonna	...	...	80'00
Benzoated Lard	...	...	90'00

Reduce the liquid extract by evaporation on a water-bath to 10 by weight, and incorporate the lard.

Belladonna ointment is applied over neuralgic areas to relieve pain. If it is applied to the anus in fissure it relieves pain and muscular spasm.

NOTES.—Belladonna ointment should contain 0·6 per cent. of the alkaloids of belladonna root. Unguentum Belladonnæ, U.S.P., is prepared by triturating 10 of extract of belladonna leaves with 5 of 49 per cent. alcohol, then adding 20 of hydrous wool fat and 65 of benzoated lard.

**UNGUENTUM BISMUTHI.****BISMUTH OINTMENT.**

Bismuth Subnitrate	...	...	12'50
Lard	...	...	87'50

Mix the bismuth subnitrate intimately with the lard.

This ointment may be applied to chilblains, or in skin diseases attended by exudation and itching.

**UNGUENTUM BISMUTHI OLEATIS.****BISMUTH OLEATE OINTMENT.**

Bismuth Oleate	...	...	10'00
Soft Paraffin	...	...	90'00

Mix the bismuth oleate with the soft paraffin.

This ointment is used as a mild astringent in inflammatory conditions of the skin.

**UNGUENTUM BORACIS.****BORAX OINTMENT.**

Borax, in fine powder	...	...	12'50
Spermaceti Ointment	...	...	87'50

Mix the borax intimately with the spermaceti ointment.

Borax ointment is especially suitable for application to chaps, chilblains, and cracked nipples.

**UNGUENTUM CADMII IODIDI.****CADMIUM IODIDE OINTMENT.**

Cadmium Iodide, in fine powder	...	...	12'50
Simple Ointment	...	...	87'50

Mix the cadmium iodide with the simple ointment.

Ointment of cadmium iodide was formerly employed as an application to enlarged glands, but it is now rarely used.

NOTE.—This ointment was official in the British Pharmacopœia, 1867.



**UNGUENTUM CALAMINÆ.**

## CALAMINE OINTMENT.

Prepared Calamine	...	...	...	...	16·00
Benzoated Lard	...	...	...	...	84·00

Mix the calamine with the benzoated lard.

Calamine ointment is used as a mild astringent in inflammatory conditions of the skin and in eczema, acne rosacea, etc.

NOTE.—Unguentum Calaminæ was official in the British Pharmacopœia, 1885.

**UNGUENTUM CAMPHORÆ.**

## CAMPHOR OINTMENT.

Camphor	...	...	...	...	10·00
Soft Paraffin	...	...	...	...	90·00

Dissolve the camphor in the soft paraffin, previously melted at as low a temperature as possible, and stir till cold.

This ointment is a mild counter-irritant and analgesic. It relieves superficial pain and irritability, and is used for chilblains and pruritus.

**UNGUENTUM CAMPHORÆ DURUM.**

## HARD CAMPHOR OINTMENT.

*Synonym.*—Camphor Ice.

Camphor	...	...	...	...	10·00
Hard Paraffin	...	...	...	...	22·00
Soft Paraffin	...	...	...	...	68·00

Dissolve the camphor in the hard and soft paraffins, previously melted at as low a temperature as possible, and stir till cold.

This preparation is used as an emollient for the skin. It promotes the healing of cracks in the skin arising from cold and exposure.

**UNGUENTUM CANTHARIDINI.**

## CANTHARIDIN OINTMENT.

Cantharidin	...	...	...	...	0·0325
Chloroform, a sufficient quantity.					
Yellow Beeswax	...	...	...	...	16·00
Olive Oil, by weight	...	...	...	...	84·00

Dissolve the cantharidin by the aid of heat in as small a quantity of chloroform as possible, then add the beeswax and oil, previously melted together on a water-bath, and stir well. Continue the application of heat until the chloroform is dissipated, and stir until cold.

This ointment is more uniform in strength than Unguentum Cantharidis, and is employed similarly.

**UNGUENTUM CANTHARIDIS.****CANTHARIDES OINTMENT.**

Cantharides, bruised	...	...	...	...	10'00
Benzoated Lard	...	...	...	...	100'00

Digest the cantharides in the previously melted lard, at a temperature of about 49°, for twelve hours; then strain through calico, gently press the residue, and stir till cold.

Cantharides ointment is a counter-irritant. It was formerly used to promote discharge from blisters. Diluted with twice its weight of soft paraffin it is employed as a pomade to stimulate the growth of the hair.

**UNGUENTUM CAPSICI.****CAPSICUM OINTMENT.**

Capsicum Fruit, bruised	...	...	...	...	24'00
Spermaceti	...	...	...	...	12'00
Olive Oil, by weight	...	...	...	...	88'00

Heat the spermaceti and olive oil on a water-bath till the former is melted; then add the capsicum fruit and allow to digest for one hour, stirring occasionally. Finally, strain out the insoluble residue, and set aside to cool, without stirring.

Capsicum ointment is used as a counter-irritant for application with friction to chronic rheumatic joints.

NOTES.—This ointment is of unsatisfactory consistency, being semi-liquid at summer temperatures. The following process has been suggested as yielding an ointment, easy of preparation, free from waste, and of full activity:—Melt 90 of hydrous wool fat on a water-bath, add 10 of liquid extract of capsicum, and stir well (see also Unguentum Oleoresinæ Capsici).

**UNGUENTUM CETACEI.****SPERMACETI OINTMENT.**

Spermaceti	...	...	...	...	20'00
White Beeswax	...	...	...	...	8'00
Almond Oil, by weight	...	...	...	...	72'00
Benzoin, in coarse powder	...	...	...	...	2'00

Add the benzoin to the previously melted spermaceti, beeswax, and almond oil, and heat gently for two hours, stirring frequently, then strain, and stir till cold.

This ointment is used as an emollient and as a basis for the application of other drugs to the skin. Applied on lint it is a cooling dressing for blisters which have been produced by friction or the application of counter-irritants.

NOTE.—Unguentum Cetacei of foreign pharmacopœias is prepared without benzoin; it is then a very bland and soothing ointment, and should be freshly prepared.

**UNGUENTUM CHRYSAROBINI.****CHRYSAROBIN OINTMENT.**

Chrysarobin	...	...	...	...	4'00
Benzoated Lard	...	...	...	...	96'00

Mix the chrysarobin gradually with the previously melted lard, heat gently until it is dissolved, and stir till cold.

Chrysarobin ointment is applied to the patches in chronic psoriasis. Diluted with 2 to 4 parts of benzoated lard it is used in chronic eczema, acne, and other skin affections. Chrysarobin ointment stains the hair, skin, and linen yellow. It should not be applied over large surfaces.

NOTE.—Unguentum Chrysarobini, U.S.P., contains 6 per cent. of chrysarobin.

**UNGUENTUM COCAINÆ.****COCAINE OINTMENT.**

Cocaine	...	...	...	...	4'00
Oleic Acid, by weight	...	...	...	...	16'00
Lard	...	...	...	...	80'00

Mix the cocaine with the oleic acid, warm gently until it is dissolved, and incorporate the lard.

Cocaine ointment is used to relieve pain and irritation in neuralgia, shingles, urticaria, and pruritus. It is also applied to painful piles. It should not be applied to denuded surfaces as burns, because the cocaine is so rapidly absorbed. For cocaine ointment for ophthalmic use see Unguenta pro Oculis.

**UNGUENTUM CONII.****CONIUM OINTMENT.**

*Synonym.*—Hemlock Ointment.

Conium Juice	...	...	...	...	200'00
Hydrous Wool Fat	...	...	...	...	75'00

Concentrate the juice of conium to 25 by evaporation on a water-bath, at a temperature not exceeding 60°; then incorporate the hydrous wool fat.

Conium ointment is applied to relieve the pain of hæmorrhoids, cancer, and anal fissure. It is of little or no value.

NOTES.—A much more satisfactory preparation can be made by evaporating 200 of conium juice to 50, and mixing it with 50 of anhydrous wool fat. A preparation more constant in strength might be prepared from the standardised liquid extract of conium.

**UNGUENTUM CREOSOTI.****CREOSOTE OINTMENT.**

Creosote, by weight	...	...	...	...	10'00
Hard Paraffin	...	...	...	...	40'00
Soft Paraffin, White	...	...	...	...	50'00

Add the creosote to the previously melted paraffins; and stir till cold.



Creosote ointment is used in parasitic skin diseases, and as a mild stimulant in psoriasis and eczema.

### UNGUENTUM CRETÆ.

#### CHALK OINTMENT.

Prepared Chalk ... ..	20'00
Spermaceti Ointment ... ..	80'00

Mix the prepared chalk with the spermaceti ointment.

Chalk ointment is applied as a mild astringent in eczema and burns.

### UNGUENTUM CUPRI OLEATIS.

#### COPPER OLEATE OINTMENT.

Copper Oleate ... ..	10'00
Lard ... ..	90'00

Mix the lard on a water-bath, add the copper oleate, mix and stir till cold.

This ointment is applied in ringworm and sometimes over corns and bunions.

### UNGUENTUM DIACHYLI.

#### DIACHYLON OINTMENT.

*Synonyms.*—Unguentum Plumbi Oleatis; Lead Oleate Ointment  
Hebra's Ointment.

Lead Plaster ... ..	50'00
Oil of Lavender, by weight ... ..	1'00
Olive Oil, by weight ... ..	49'00

Melt together the lead plaster and olive oil, add the oil of lavender, and stir until cold. Spread on lint or linen, it is an excellent sedative application for eczema and other irritable conditions of the skin. It should be freshly prepared.

NOTE.—This preparation corresponds to Unguentum Diachyli, U.S.P.

### UNGUENTUM ELEMI.

#### ELEMI OINTMENT.

Elemi ... ..	20'00
Simple Ointment... ..	80'00

Melt the elemi and simple ointment together, strain through flannel, and stir constantly until the ointment solidifies.

Elemi ointment was formerly employed as a stimulant application to ulcers.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

**UNGUENTUM EUCALYPTI.****EUCALYPTUS OINTMENT.**

Oil of Eucalyptus, by weight	...	...	...	10·00
Hard Paraffin	...	...	...	40·00
Soft Paraffin, white	...	...	...	50·00

Add the oil of eucalyptus to the previously melted paraffins, and stir till cold.

Eucalyptus ointment is employed as a mild antiseptic dressing and as an application to hæmorrhoids.

**UNGUENTUM GALLÆ.****GALL OINTMENT.**

Galls, in very fine powder	...	...	...	20·00
Benzoated Lard	...	...	...	80·00

Mix the powdered galls with the benzoated lard by trituration.

Gall ointment is used as an astringent for hæmorrhoids.

NOTE.—Unguentum Gallæ, U.S.P., is prepared with simple ointment.

**UNGUENTUM GALLÆ CUM OPIO.****GALL AND OPIUM OINTMENT.**

Gall Ointment	...	...	...	92·5
Opium, in very fine powder	...	...	...	7·5

Mix the powdered opium with the gall ointment by trituration.

This ointment is used similarly to Unguentum Gallæ for hæmorrhoids. To relieve pain, cocaine or belladonna is superior to opium, as the latter only exerts a sedative action after absorption.

**UNGUENTUM GLYCERINI PLUMBI SUBACETATIS.****LEAD SUBACETATE OINTMENT.**

Glycerin of Lead Subacetate, by weight	...	...	...	16·50
Paraffin Ointment, white	...	...	...	82·50

Gradually incorporate the glycerin of lead subacetate with the paraffin ointment.

This ointment is employed as a mild astringent and sedative in irritable conditions of the skin, chronic eczema, pruritus, etc.

**UNGUENTUM GYNOCARDIÆ.****GYNOCARDIA OINTMENT.**

*Synonyms.*—Unguentum Chaulmoogræ; Chaulmoogra Ointment.

Gynocardia Oil, by weight	...	...	...	10·00
Hard Paraffin	...	...	...	40·00
Soft Paraffin, white	...	...	...	50·00

Melt together the hard and soft paraffins, add the oil, and stir till cold.

This ointment is applied to the skin in leprosy, and in chronic skin diseases.

NOTE.—Gynocardia ointment is official in India and the Eastern Colonies.

### UNGUENTUM HAMAMELIDIS.

#### HAMAMELIS OINTMENT.

Liquid Extract of Hamamelis	...	...	10·00
Hydrous Wool Fat	...	...	90·00

Mix the liquid extract with the hydrous wool fat.

Hamamelis ointment is used as an astringent application to piles.

### UNGUENTUM HYDRARGYRI.

#### MERCURY OINTMENT.

Mercury	...	...	...	...	48·00
Lard	...	...	...	...	48·00
Prepared Suet	...	...	...	...	3·00

Rub together until globules of mercury are no longer visible.

Mercury ointment is used for inunction in syphilis, 2 to 4 grammes ( $\frac{1}{2}$  to 1 drachm) being rubbed in daily. Dilute mercury ointments are used in parasitic skin diseases, in chronic synovitis, glandular enlargements, and tuberculous peritonitis. The mercury prevents the movements of the white blood corpuscles in the skin vessels over which it is rubbed, and so inhibits inflammation.

NOTES.—The mercury in such preparations as the above can be easily "killed" by trituration with a small quantity of wool fat. Unguentum Hydrargyri, U.S.P. is prepared with 2 of oleinate of mercury, 50 of mercury, 23 of prepared suet, and 25 of benzoinated lard.

### UNGUENTUM HYDRARGYRI AMMONIATI.

#### AMMONIATED MERCURY OINTMENT.

*Synonym.*—White Precipitate Ointment.

Ammoniated Mercury	...	...	...	10·00
Paraffin Ointment, white	...	...	...	90·00

Mix the ammoniated mercury with the paraffin ointment.

Ammoniated mercury ointment is used to destroy pediculi, and as an application to the skin in herpes, scabies, and other parasitic skin diseases. Diluted with 2 parts of soft paraffin it is applied to the eyelids in ophthalmia tarsi.

NOTE.—Unguentum Hydrargyri Ammoniatum, U.S.P., is prepared with 10 of ammoniated mercury, 50 of white, soft paraffin, and 40 of hydrous wool fat.



**UNGUENTUM HYDRARGYRI COMPOSITUM.**

COMPOUND MERCURY OINTMENT.

*Synonym.*—Scott's Dressing.

Mercury Ointment	...	...	...	...	40'00
Yellow Beeswax	...	...	...	...	24'00
Olive Oil, by weight	...	...	...	...	24'00
Camphor, in flowers	...	...	...	...	12'00

Heat the beeswax, olive oil, and mercury ointment on a water-bath, stir till mixed, add the camphor, and stir until cold.

Compound mercury ointment is used mainly in chronic synovitis and joint enlargements. It may be applied spread on lint or on chamois or white plaster leather cut into strips.

**UNGUENTUM HYDRARGYRI DILUTUM.**

DILUTED MERCURY OINTMENT.

*Synonyms.*—Unguentum Hydrargyri Mite; Blue Ointment; Trooper's Ointment.

Mercury Ointment	...	...	...	...	33'00
Lard	...	...	...	...	67'00

Mix the mercury ointment with the lard.

Diluted mercury ointment is used as a parasiticide to destroy pediculi pubis, and as an application to swollen joints and glands.

NOTE.—Unguentum Hydrargyri Dilutum, U.S.P., is prepared with 67 of mercurial ointment and 33 of soft paraffin.

**UNGUENTUM HYDRARGYRI ET PLUMBI ET ZINCI.**

MERCURY, LEAD, AND ZINC OINTMENT.

*Synonym.*—Unguentum Metallorum.

Mercurous Chloride	...	...	...	...	2'00
Mercuric Nitrate Ointment	...	...	...	...	4'00
Lead Acetate, in powder	...	...	...	...	2'00
Zinc Oxide, finely sifted	...	...	...	...	4'00
Soft Paraffin, yellow, sufficient to produce	...	...	...	...	100'00

Mix the powders with the mercuric nitrate ointment, and add the soft paraffin.

This ointment is used as a stimulant and antiseptic in eczema and chronic skin diseases, and for application to chronic sores. A mixture of mercuric nitrate, lead acetate, and zinc oxide ointments is often preferred.

**UNGUENTUM HYDRARGYRI IODIDI RUBRI.**

MERCURIC IODIDE OINTMENT.

*Synonym.*—Red Iodide of Mercury Ointment.

Mercuric Iodide, in fine powder	...	...	...	...	4'00
Benzoated Lard	...	...	...	...	96'00

Mix the mercuric iodide with the benzoated lard.

Mercuric iodide ointment is used in goitre, bronchocele, inveterate ringworm, lupus, and in syphilitic lesions. It is frequently applied one-half or one-fourth of this strength. Stronger ointments are powerfully counter-irritant, and are used in veterinary practice.

### UNGUENTUM HYDRARGYRI NITRATIS.

#### MERCURIC NITRATE OINTMENT.

*Synonym.*—Nitrate of Mercury Ointment.

Mercury ...	...	...	...	...	7'00
Nitric Acid ...	...	...	...	...	21'00
Lard ...	...	...	...	...	28'00
Olive Oil, by weight ...	...	...	...	...	49'00

Add the mercury to the nitric acid and dissolve without heat, occasionally shaking gently. Gradually add the cold solution, with constant stirring, to a mixture of the lard and oil at a temperature of about  $143^{\circ}$ , and contained in a large earthenware jar. When frothing has ceased, the mixture should have a temperature of not less than  $93^{\circ}$ , and must be stirred until cold. It should then be of a pale lemon colour and of a firm consistence.

Mercuric nitrate ointment is applied as an antiseptic and stimulant in chronic skin diseases. It is, however, too irritant for general use, and the diluted forms are generally employed.

NOTES.—Various methods have been suggested for the preparation of this ointment, but the above method yields a satisfactory product if care be taken. Unguentum Hydrargyri Nitratis, U.S.P., is prepared with 7 of mercury,  $17\frac{1}{2}$  of nitric acid (68 per cent.), and 76 of lard, free from water.

### UNGUENTUM HYDRARGYRI NITRATIS DILUTUM.

#### DILUTED MERCURIC NITRATE OINTMENT.

*Synonym.*—Diluted Nitrate of Mercury Ointment.

Mercuric Nitrate Ointment ...	...	...	20'00
Soft Paraffin, yellow ...	...	...	80'00

Mix the mercuric nitrate ointment with the soft paraffin.

It is applied in eczema, psoriasis, and other chronic skin diseases.

### UNGUENTUM HYDRARGYRI NITRATIS MITIUS.

#### MILDER MERCURIC NITRATE OINTMENT.

Mercuric Nitrate Ointment ...	...	...	12'5
Soft Paraffin, yellow ...	...	...	87'5

Mix the mercuric nitrate ointment with the soft paraffin.

This ointment is applied to the eyelids, by means of a glass rod, in ophthalmia tarsi, and to the nostrils, with a brush, in ozæna.

**UNGUENTUM HYDRARGYRI OLEATIS.****MERCURIC OLEATE OINTMENT.**

Mercuric Oleate ... ..	25·00
Benzoated Lard ... ..	75·00

Mix the mercuric oleate with the benzoated lard.

Mercuric oleate ointment is applied to syphilitic lesions, secondary and tertiary; it is also applied to swollen glands and joints in place of mercurial ointment. Many practitioners, however, prefer Oleinum Hydrargyri, which is absorbed more readily by the skin.

**UNGUENTUM HYDRARGYRI OXIDI FLAVI.****YELLOW MERCURIC OXIDE OINTMENT.**

Yellow Mercuric Oxide, in very fine powder ...	2·00
Soft Paraffin, yellow ... ..	98·00

Mix the mercuric oxide with the soft paraffin.

This ointment is used chiefly for application to the eyelids in tinea tarsi and conjunctivitis; it is best applied by means of a glass rod.

NOTES.—When required for use as an eye ointment, this preparation is best prepared from the freshly precipitated oxide, and it has been suggested that the yellow mercuric oxide, freshly precipitated in the shade, washed until free from traces of alkali, and dried until it contains not more than 20 per cent. of water, should be mixed with 10 of anhydrous wool fat, and sufficient soft paraffin to produce 100. Unguentum Hydrargyri Oxidi Flavi, U.S.P., is prepared with 10 each of yellow mercuric oxide and water, and 40 each of hydrous wool fat and soft paraffin.

**UNGUENTUM HYDRARGYRI OXIDI RUBRI.****RED MERCURIC OXIDE OINTMENT.**

*Synonym.*—Red Precipitate Ointment.

Red Mercuric Oxide, in very fine powder ...	10·00
Paraffin Ointment, yellow ... ..	90·00

Mix the mercuric oxide with the paraffin ointment.

It is used in eczema and other chronic skin affections, and is applied to the scalp for seborrhœa and alopecia.

NOTE.—Unguentum Hydrargyri Oxidi Rubri, U.S.P., is prepared with 10 each of red mercuric oxide and water, and 40 each of hydrous wool fat and soft paraffin.

**UNGUENTUM HYDRARGYRI SUBCHLORIDI.****MERCUROUS CHLORIDE OINTMENT.**

*Synonym.*—Calomel Ointment.

Mercurous Chloride ... ..	10·00
Benzoated Lard ... ..	90·00

Mix the mercurous chloride with the benzoated lard.

Calomel ointment is used in syphilitic affections and for pruritus, especially pruritis ani.

NOTE.—A calomel ointment composed of calomel, 1, and hydrous wool fat, 3, has been recommended by Metchnikoff as a prophylactic application to prevent syphilitic infection.



**UNGUENTUM ICHTHAMOLIS.****ICHTHAMOL OINTMENT.**

*Synonym.*—Ammonium Ichthosulphonate Ointment.

Ammonium Ichthosulphonate	...	...	...	10'00
Hydrous Wool Fat	...	...	...	90'00

Mix the ammonium ichthosulphonate with the hydrous wool fat.

Ichthamol ointment is applied in psoriasis, eczema, acne, and other chronic skin diseases as a mild stimulant and antiseptic.

**UNGUENTUM IODI.****IODINE OINTMENT.**

Iodine	...	...	...	...	4'00
Potassium Iodide	...	...	...	...	4'00
Glycerin, by weight	...	...	...	...	12'00
Lard	...	...	...	...	80'00

Rub the iodine and potassium iodide together in a mortar, add the glycerin, and gradually incorporate the lard.

Iodine ointment is used as a mild counter-irritant and to reduce swellings. It is inferior to the tincture and strong solution of iodine for these purposes.

NOTES.—A glass or porcelain mortar should be employed in making this ointment. Unguentum Iodi, U.S.P., is prepared with benzoinated lard.

**UNGUENTUM IODI DENIGRESCENS.****STAINLESS IODINE OINTMENT.**

Iodine, in fine powder	...	...	...	5'00
Soft Paraffin	...	...	...	95'00

Heat the paraffin until liquefied, add the iodine, and heat gently while stirring until combination is complete; then remove from the source of heat, and stir until cold.

When rubbed on the skin, this ointment is readily absorbed and does not stain. It is applied in lymphadenitis, etc.

**UNGUENTUM IODOFORMI.****ODOFORM OINTMENT.**

Iodoform, in fine powder	...	...	...	10'00
Paraffin Ointment, yellow	...	...	...	90'00

Mix the iodoform with the paraffin ointment.

It is used for application to venereal sores, foul ulcers, buboes, etc.

NOTE.—Unguentum Iodoformi, U.S.P., is prepared with lard.

**UNGUENTUM IODOFORMI ET EUCALYPTI.****ODOFORM AND EUCALYPTUS OINTMENT.**

Iodoform	...	...	...	...	2'00
Oil of Eucalyptus, by weight	...	...	...	...	19'00
Hard Paraffin	...	...	...	...	64'50
Soft Paraffin	...	...	...	...	14'50

Heat the iodoform gently with the oil of eucalyptus until solution is effected; add the hard and soft paraffins, previously melted together, and stir till cold.

This ointment is used similarly to Unguentum Iodoformi and for urethral injection in gonorrhœa.

**UNGUENTUM KAOLINI.****KAOLIN OINTMENT.**

Kaolin	...	...	...	...	30'00
Soft Paraffin, white	...	...	...	...	35'00
Hard Paraffin	...	...	...	...	35'00

Melt together the hard and soft paraffins, add the kaolin, and stir until the mixture is cold.

Kaolin ointment is used as a pill excipient for such substances as silver nitrate and oxide, potassium permanganate or bichromate, and the double chloride of gold and sodium.

**UNGUENTUM METHYLIS SALICYLATIS.****METHYL SALICYLATE OINTMENT.**

Methyl Salicylate	...	...	...	...	12'50
Hydrous Wool Fat, sufficient to produce	...	...	...	...	100'00

Mix the methyl salicylate with the hydrous wool fat.

This ointment is applied with friction over rheumatic joints.

**UNGUENTUM METHYLIS SALICYLATIS COMPOSITUM.****COMPOUND METHYL SALICYLATE OINTMENT.**

*Synonyms.*—Unguentum Betulæ Compositum; Unguentum Analgesicum; Analgesic Balsam.

Methyl Salicylate	...	...	...	...	12'50
Menthol	...	...	...	...	2'50
Oil of Eucalyptus	...	...	...	...	2'50
Essential Oil of Camphor	...	...	...	...	2'5
Hydrous Wool Fat	...	...	...	...	25'00
Paraffin Ointment, sufficient to produce	...	...	...	...	100'00

Mix the menthol with the methyl salicylate and oils by trituration, add the hydrous wool fat, and make up the required weight with the paraffin ointment.

This ointment is used both for its analgesic and curative properties in sciatica, lumbago, and rheumatism.

**UNGUENTUM MYLABRIDIS.****MYLABRIS OINTMENT.**

Mylabris, bruised	...	...	...	10'00
Benzoated Lard or Suet	...	...	...	100'00

Digest the mylabris in the previously melted lard (or suet), at a temperature of about 49°, for twelve hours; then strain through calico, gently press the residue, and stir till cold.

Mylabris ointment is official in India, the African Colonies, and the Eastern Colonies, in place of Unguentum Cantharidis; the basis may be modified to meet the exigencies of climate, and suet must be employed in place of lard where caste prejudices render the use of the latter objectionable.

**UNGUENTUM MYROBALANI.****MYROBALAN OINTMENT.**

Myrobalans, in very fine powder	...	...	20'00
Benzoated Lard or Suet	...	...	80'00

Mix the powdered myrobalans with the benzoated lard (or suet).

Myrobalan ointment is official in India and the Eastern Colonies, in place of ointment of galls; the basis may be modified to meet the exigencies of climate.

**UNGUENTUM MYROBALANI CUM OPIO.****MYROBALAN AND OPIUM OINTMENT.**

Myrobalan Ointment	...	...	92'50
Opium, in very fine powder	...	...	7'50

Mix the opium with the myrobalan ointment.

Myrobalan and opium ointment is official, in place of ointment of galls and opium, in India and the Eastern Colonies; the basis may be modified to meet the exigencies of climate.

**UNGUENTUM NAPHTHOLIS.****NAPHTHOL OINTMENT.**

*Synonym.*—Kaposi's Ointment.

Naphthol, in fine powder	...	...	10'00
Lard	...	...	90'00

Mix the naphthol with the lard.

Naphthol ointment is applied as a parasiticide in scabies and as a stimulant and antiseptic in chronic eczema and psoriasis.

NOTE.—Unguentum Naphtholis Compositum (Kaposi) is prepared with 15 of naphthol, 10 of prepared chalk, 50 of soft soap, and 100 of lard.

**UNGUENTUM OLEORESINÆ CAPSICI.****CAPSICUM OLEORESIN OINTMENT.**

Oleoresin of Capsicum	...	...	18'00
Yellow Beeswax	...	...	9'00
Benzoated Lard	...	...	73'00



Melt the wax and lard at a low temperature, add the oleo-resin of capsicum, mix thoroughly, strain through muslin, and stir till cold.

This ointment is a valuable counter-irritant in chronic rheumatism and in pulmonary complaints, etc.

### UNGUENTUM PARAFFINI.

#### PARAFFIN OINTMENT.

Hard Paraffin	...	...	...	...	30'00
Soft Paraffin	...	...	...	...	70'00

Melt the hard and soft paraffins together, remove from the source of heat, and stir constantly till cold.

When paraffin ointment is used as the basis of white ointments, the white variety of soft paraffin should be employed, and the yellow variety when used as the basis of coloured ointments. The proportions of hard and soft paraffins may be modified to meet climatic conditions.

This is used as a basis for ointments that are required to exert a superficial effect only, not to be absorbed.

### UNGUENTUM PERUVIANUM.

#### BALSAM OF PERU OINTMENT.

Balsam of Peru, by weight	...	...	...	12'50
Lard	...	...	...	87'50

Mix the balsam of Peru with the lard.

It is applied as a parasiticide for scabies and pediculi, and in some skin diseases.

### UNGUENTUM PICIS CARBONIS.

#### COAL TAR OINTMENT.

Solution of Coal Tar, by weight	...	...	6'00
Soft Paraffin, yellow, sufficient to produce	...	...	100'00

Mix the solution of coal tar with the soft paraffin.

Coal tar ointment is used in chronic eczema and scaly skin diseases as a mild stimulant and antiseptic.

### UNGUENTUM PICIS CARBONIS COMPOSITUM.

#### COMPOUND COAL TAR OINTMENT.

Solution of Coal Tar, by weight	...	...	6'00
Ammoniated Mercury	...	...	3'00
Soft Paraffin, yellow, sufficient to produce	...	...	100'00

Mix the solution of coal tar and the ammoniated mercury with the soft paraffin.

This ointment is used similarly to Unguentum Picis Carbonis.

**UNGUENTUM PICIS LIQUIDÆ.****TAR OINTMENT.**

Tar	...	...	...	...	...	71'50
Yellow Beeswax	...	...	...	...	...	28'50

Add the tar to the beeswax, previously melted at a low temperature, and stir till cold.

Tar ointment is applied to relieve pruritus and as an antiseptic in eczema and psoriasis.

NOTE. — Unguentum Picis Liquidæ, U.S.P., is prepared with 50 of tar, 15 of yellow beeswax, and 35 of lard.

**UNGUENTUM PICIS MOLLE.****SOFT TAR OINTMENT.**

Tar	...	...	...	...	...	71'00
Almond Oil, by weight	...	...	...	...	...	14'50
Beeswax	...	...	...	...	...	14'50

Melt the ingredients together at a low temperature, and stir the mixture till cold.

This ointment is used similarly to Unguentum Picis Liquidæ.

**UNGUENTUM PLUMBI ACETATIS.****LEAD ACETATE OINTMENT.**

Lead Acetate, in fine powder	...	...	...	4'00
Paraffin Ointment	...	...	...	96'00

Mix the lead acetate with the paraffin ointment.

This ointment is used in pruritus ani, as an astringent application for piles, and for inflammatory conditions of the skin and mucous membranes.

**UNGUENTUM PLUMBI CARBONATIS.****LEAD CARBONATE OINTMENT.**

Lead Carbonate, in fine powder	...	...	10'00
Paraffin Ointment, white	...	...	90'00

Mix the lead carbonate with the paraffin ointment.

Lead carbonate ointment is a mildly astringent and soothing application for burns, ulcers, and inflamed or excoriated surfaces.

**UNGUENTUM PLUMBI IODIDI.****LEAD IODIDE OINTMENT.**

Lead Iodide, in fine powder	...	...	10'00
Paraffin Ointment, yellow	...	...	90'00

Mix the lead iodide with the paraffin ointment.

Lead iodide ointment produces mild irritation, but does not stain the skin like iodine; it is occasionally used for application to indolent swellings and enlarged joints.

**UNGUENTUM POTASSÆ SULPHURATÆ.****SULPHURATED POTASH OINTMENT.**

Sulphurated Potash	...	...	...	...	6.00
Hard Paraffin	...	...	...	...	24.00
Soft Paraffin	...	...	...	...	70.00

Reduce the sulphurated potash to fine powder in a mortar; then add the melted mixture of paraffins, and rub together until the ointment is smooth and free from grittiness.

This ointment was formerly used for acne, psoriasis, and scabies; it is now rarely employed.

NOTES.—This preparation was official in the British Pharmacopœia, 1885. It should be prepared freshly, as required.

**UNGUENTUM POTASSII IODIDI.****POTASSIUM IODIDE OINTMENT.**

Potassium Iodide	...	...	...	...	10.00
Potassium Carbonate	...	...	...	...	9.60
Distilled Water	...	...	...	...	9.40
Benzoated Lard	...	...	...	...	80.00

Place the lard in a slightly warmed mortar, and gradually incorporate the potassium iodide and potassium carbonate, previously dissolved in the distilled water.

Potassium iodide ointment is rubbed over swollen glands and chronically enlarged joints to promote absorption; it is of little value.

NOTE.—Unguentum Potassii Iodidi, U.S.P., contains 10 per cent. of water.

**UNGUENTUM PYROGALLOL OXIDATI.****PYROGALLOL OXIDE OINTMENT.**

Oxidised Pyrogallol Acid	...	...	...	...	5.00
Salicylic Acid	...	...	...	...	5.00
Hydrous Wool Fat, sufficient to produce	...	...	...	...	100.00

Mix the acids with the hydrous wool fat.

This ointment has been used, with reported satisfactory results, in cases of leprosy.

**UNGUENTUM RANUNCULI FICARIÆ.****PILEWORT OINTMENT.**

Pilewort	...	...	...	...	30.00
Lard, sufficient to produce	...	...	...	...	100.00

Cut the pilewort into small pieces, add it to three times its weight of melted lard, and allow it to digest at a temperature of 38° for twenty-four hours; then strain, press, and add sufficient lard to produce the required weight.

This ointment has been used for hæmorrhoids.



**UNGUENTUM RESINÆ.****RESIN OINTMENT.***Synonym.*—Basilicon Ointment.

Resin, in powder	...	...	...	...	28·00
Yellow Beeswax	...	...	...	...	28·00
Olive Oil, by weight	...	...	...	...	28·00
Lard	...	...	...	...	21·00

Melt the resin and beeswax together, add the lard and oil, strain and stir till cold.

Resin ointment is mildly stimulating; it is applied on lint to indolent sores and ulcers.

**UNGUENTUM RESORCINI.****RESORCIN OINTMENT.**

Resorcin ...	...	...	...	...	12·50
Glycerin ...	...	...	...	...	12·50
Hydrous Wool Fat	...	...	...	...	25·00
Soft Paraffin, sufficient to produce	...	...	...	...	100·00

Dissolve the resorcin in the glycerin, mix the solution with the hydrous wool fat, and add the soft paraffin.

It is antiseptic, antipruritic, and mildly stimulating.

**UNGUENTUM RESORCINI COMPOSITUM.****COMPOUND RESORCIN OINTMENT.***Synonym.*—Unguentum Rusci Compositum.

Resorcin...	...	...	...	...	8·50
Distilled Water...	...	...	...	...	8·00
Oil of White Birch, by weight	...	...	...	...	8·00
Zinc Oxide, finely sifted	...	...	...	...	8·50
Soft Paraffin	...	...	...	...	33·50
Wool Fat	...	...	...	...	33·50

Dissolve the resorcin in the distilled water, and mix with the other ingredients.

Compound resorcin ointment is a useful antiseptic and antipruritic; it is used in eczema, acne rosacea, etc.

**UNGUENTUM RESORCINI CUM AMYLO.****RESORCIN OINTMENT WITH STARCH.***Synonyms.*—Pasta Zinci Oxidi et Resorcini; Ihle's Paste.

Resorcin...	...	...	...	...	2·00
Zinc Oxide	...	...	...	...	24·00
Starch, in powder	...	...	...	...	24·00
Hydrous Wool Fat	...	...	...	...	24·00
Soft Paraffin, sufficient to produce	...	...	...	...	100·00

Mix the resorcin, zinc oxide, and starch with the hydrous wool fat, and add the soft paraffin,

**UNGUENTUM ROSATUM.**

ROSE OINTMENT.

*Synonym.*—Rose Lip Salve.

Alkanna Root, bruised...	...	...	...	3'00
White Beeswax	...	...	...	1'00
Oil of Rose	...	...	...	0'20
Lard, sufficient to produce	...	...	...	100'00

Digest the alkanna root in the melted lard on a water-bath for one hour, then strain through muslin, add the white beeswax, heat until the wax is melted, and stir the mixture till cold, adding the oil of rose after the mixture has acquired a creamy consistence.

This ointment is a useful emollient, and is employed as a lip salve.

NOTE.—Unguentum Rosatum, as used abroad, is often simply a mixture of white beeswax, lard, and rose water, without colour.

**UNGUENTUM SABINÆ.**

SAVIN OINTMENT.

Fresh Savin Tops, bruised	...	...	...	42'00
Yellow Beeswax	...	...	...	16'00
Benzoated Lard	...	...	...	84'00

Melt the lard and beeswax together on a water-bath, add the savin, and digest for twenty minutes; then remove the mixture from the water-bath, express through calico, and stir till cold.

Savin ointment was formerly employed to promote discharge from blistered surfaces. It is now rarely used.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

**UNGUENTUM SAMBUCI.**

ELDER OINTMENT.

Elder Flowers, fresh	...	...	...	100'00
Lard	...	...	...	100'00

Heat the elder flowers with the lard until they become crisp, then strain through a linen cloth with pressure, and allow to cool.

Elder flower ointment is used as a basis for pomades and cosmetic ointments.

NOTE.—This preparation was official in the London Pharmacopœia, 1851.

**UNGUENTUM SAMBUCI VIRIDE.**

GREEN ELDER OINTMENT.

Elder Leaves, fresh	...	...	...	50'00
Lard	...	...	...	66'00
Prepared Suet	...	...	...	34'00

Heat the elder leaves with the melted lard and suet until the colour is extracted, then strain through a linen cloth with pressure, and allow to cool.

Green elder ointment is a domestic remedy for sprains, bruises, etc., and is used as an emollient cooling ointment,

NOTE.—This preparation was official in Dublin Pharmacopœia, 1826.

**UNGUENTUM SIMPLEX.**

## SIMPLE OINTMENT.

White Beeswax...	...	...	...	26·00
Benzoated Lard	...	...	...	39·00
Almond Oil, by weight...	...	...	...	35·00

Melt together on a water-bath; then remove, and stir constantly until the ointment solidifies.

Simple ointment is used as an emollient and as a basis for the application of drugs that are required to penetrate the skin.

NOTES.—This preparation was official in the British Pharmacopœia, 1885. It corresponds to Unguentum, U.S.P., which is prepared by melting 20 of white wax, adding 80 of benzoated lard, and mixing.

**UNGUENTUM STAPHISAGRIÆ.**

## STAVESACRE OINTMENT.

Stavesacre Seeds...	...	...	...	20·00
Yellow Beeswax ...	...	...	...	10·00
Benzoated Lard ...	...	...	...	85·00

Digest the previously crushed seeds with the lard for two hours on a water-bath, strain, press through calico, add the beeswax, dissolve by the aid of a gentle heat, and stir till cold.

Stavesacre ointment is used as a parasiticide to kill pediculi capitis et pubis.

**UNGUENTUM STRAMONII.**

## STRAMONIUM OINTMENT.

Extract of Stramonium	...	...	...	10·00
Alcohol (45 per cent.)	...	...	...	5·00
Hydrous Wool Fat	...	...	...	20·00
Benzoated Lard	...	...	...	65·00

Triturate the extract with the alcohol till a smooth mixture is obtained, then add the hydrous wool fat, mix thoroughly, and add the benzoated lard.

This ointment is used, like belladonna ointment, as a local anodyne, and to diminish secretion in acute inflammatory conditions, hæmorrhoids, etc.

**UNGUENTUM SULPHURIS.**

## SULPHUR OINTMENT.

Sublimed Sulphur, finely sifted...	...	...	10·00
Benzoated Lard ...	...	...	90·00

Mix the sulphur with the benzoated lard.

Sulphur ointment, when rubbed into the skin, forms a small quantity of irritant sulphide; it is applied to the skin for certain diseases, especially scabies.

Note.—Unguentum Sulphuris, U.S.P., is prepared with 15 per cent. of washed sulphur,



**UNGUENTUM SULPHURIS CAMPHORATUM.****CAMPHORATED SULPHUR OINTMENT.**

Precipitated Sulphur	...	...	...	2'00
Carbolic Acid	...	...	...	3'00
Resorcin	...	...	...	3'00
Camphor, in powder	...	...	...	3'00
Solution of Coal Tar	...	...	...	5'00
Benzoated Lard	...	...	...	42'00
Soft Paraffin, white, to produce	...	...	...	100'00

Mix the sulphur, resorcin, and camphor with the carbolic acid and solution of coal tar, then add the benzoated lard and soft paraffin.

**UNGUENTUM SULPHURIS COMPOSITUM.****COMPOUND SULPHUR OINTMENT.**

*Synonyms.*—Unguentum ad Scabiem Viennense;  
Wilkinson's Ointment.

Sublimed Sulphur, finely sifted	...	...	15'00
Precipitated Chalk	...	...	10'00
Tar	...	...	15'00
Lard	...	...	30'00
Soft Soap	...	...	30'00

Mix the powders with the lard and soft soap.

This ointment is used in scabies and psoriasis.

NOTE.—Unguentum Sulphuris Compositum, of the London Pharmacopœia, 1851, was prepared by mixing 16 of sulphur, 5 of white hellebore,  $\frac{1}{8}$  of potassium nitrate, 16 of soft soap, and 48 of lard.

**UNGUENTUM SULPHURIS ET RESORCINI.****SULPHUR AND RESORCIN OINTMENT.**

Precipitated Sulphur	...	...	...	4'50
Resorcin...	...	...	...	3'00
Soft Paraffin, yellow, sufficient to produce	...	...	...	100'00

Mix the sulphur and resorcin with the soft paraffin.

Sulphur and resorcin ointment is used in acne, eczema, and other chronic skin diseases.

**UNGUENTUM SULPHURIS HYPOCHLORITIS.****SULPHUR HYPOCHLORITE OINTMENT.**

Sublimed Sulphur	...	...	...	12'00
Sulphur Chloride...	...	...	...	2'00
Essential Oil of Almonds, by weight	...	...	...	2'00
Lard	...	...	...	84'00

Mix the sulphur with the essential oil of almonds and lard; then add the sulphur chloride quickly.

This ointment is used in acne, psoriasis, scabies, etc. For sensitive skins it is prepared half this strength.

**UNGUENTUM SULPHURIS IODIDI.****SULPHUR IODIDE OINTMENT.**

Sulphur Iodide ...	...	...	...	...	4'00
Glycerin, by weight ...	...	...	...	...	4'00
Benzoated Lard ...	...	...	...	...	92'00

Rub the sulphur iodide to a smooth paste with the glycerin, in a slightly warmed mortar, gradually incorporate the lard, and stir till cold.

Sulphur iodide ointment has an action similar to that of iodine but weaker; it is used in acne, scabies, and other parasitic affections of the skin.

**UNGUENTUM SUPRARENALIS.****SUPRARENAL OINTMENT.**

Liquid Extract of Suprenals ...	...	...	10'00
Liquid Paraffin ...	...	...	25'00
Hydrous Wool Fat, sufficient to produce ...	...	...	100'00

Mix the liquid extract with 50 of the hydrous wool fat, then add the liquid paraffin, and sufficient hydrous wool fat to make up the required weight.

This ointment is sometimes perfumed with otto of rose.

Suprarenal ointment is used to relieve congestion in vascular hæmorrhoids; it is best applied by a rectal ointment introducer.

**UNGUENTUM TEREBINTHINÆ.****TURPENTINE OINTMENT.**

Oil of Turpentine, by weight ...	...	...	45'00
Resin, in coarse powder ...	...	...	5'00
Yellow Beeswax ...	...	...	25'00
Lard ...	...	...	25'00

Melt the resin, beeswax, and lard on a water-bath, add the oil of turpentine, gradually remove from the source of heat, and stir constantly until the ointment solidifies.

Turpentine ointment was formerly used as a mild counter-irritant and rubefacient for rheumatic joints, etc.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

**UNGUENTUM VERATRINÆ.****VERATRINE OINTMENT.**

Veratrine ...	...	...	...	2'00
Oleic Acid, by weight ...	...	...	...	8'00
Lard ...	...	...	...	90'00

Mix the veratrine with the oleic acid, warm gently until dissolved, and incorporate the lard.

Veratrine ointment is applied as an anodyne in facial neuralgia. It first stimulates the sensory nerve-endings, and later depresses them. It must not be used where the skin is broken.

NOTE.—Unguentum Veratrinæ, U.S.P., is prepared with 4 of veratrine, 6 of almond oil, and 90 of benzoinated lard.

## UNGUENTUM ZINCI.

### ZINC OINTMENT.

Zinc Oxide, finely sifted	...	...	...	15'00
Benzoated Lard	...	...	...	85'00

Melt the lard at a low temperature, add the zinc oxide gradually and stir constantly till cold.

Zinc ointment is used as a mild astringent for inflammatory conditions of the skin, to heal slight excoriations, and to allay irritation in eczema and other diseases.

NOTE.—Unguentum Zinci Oxidi, U.S.P., is prepared with 20 of zinc oxide and 80 of benzoinated lard.

## UNGUENTUM ZINCI OLEATIS.

### ZINC OLEATE OINTMENT.

Zinc Sulphate	...	...	...	60'00
Hard Soap	...	...	...	120'00
Distilled Water, boiling, a sufficient quantity.				
Soft Paraffin, white, a sufficient quantity.				

Prepare the zinc oleate by dissolving the zinc sulphate in 120, and the hard soap in 1200, of the distilled water, mixing the solutions, and collecting the precipitate; wash the zinc oleate with hot water until almost free from sulphates, dry on a water-bath, mix with an equal weight of previously melted soft paraffin, and stir till cold.

Zinc oleate ointment resembles zinc ointment in its properties.

## UNGUENTUM ZINCI STEARATIS.

### ZINC STEARATE OINTMENT.

Zinc Stearate	...	...	...	50'00
Soft Paraffin, white	...	...	...	50'00

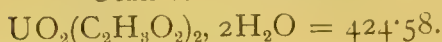
Melt the soft paraffin, add the zinc stearate, heat until the mixture becomes smooth, then stir till cold.

This ointment is feebly antiseptic and astringent, and may be used instead of Unguentum Zinci.



**URANII ACETAS.**

URANIUM ACETATE.

*Synonyms.*—Uranyl Acetate; Uranic Acetate.

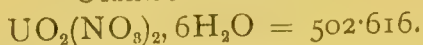
Uranium acetate,  $\text{UO}_2(\text{CH}_3\text{CO}_2)_2, 2\text{H}_2\text{O}$ , may be obtained by drying the nitrate on a water-bath, and heating to redness until it is free from nitric acid or begins to give off oxygen, dissolving the residual uranium oxide in 30 per cent. acetic acid by aid of heat, and evaporating to crystallisation. If crystallisation is promoted from hot concentrated solutions the salt will contain  $2\text{H}_2\text{O}$ , but if from dilute solutions cooled below  $10^\circ$  the crystals will contain three molecules of water. The  $3\text{H}_2\text{O}$  salt when heated to  $200^\circ$  gives off one molecule of water of crystallisation, and the remainder at  $275^\circ$ .

It occurs in the form of yellow, transparent, rhombic crystals. Readily soluble in water, the solution being coloured golden-yellow. As a rule the crystals contain some basic salt, and a clear solution is only obtainable on the addition of acetic acid. With the acetates of ammonium, potassium, sodium, calcium, and other bases it forms crystalline double salts. The aqueous solution when exposed to light and air, especially in a warm place, undergoes decomposition. A characteristic reaction for uranium acetate, as well as for other uranium salts, is the fine red colour produced on the addition of hydrogen peroxide, and then potassium carbonate either in a solid state or in very concentrated solution. If to this red solution two or three times its volume of alcohol be added, a red precipitate is obtained, which rapidly collects at the bottom of the test-tube. The same reaction may be used for the detection of hydrogen peroxide.

The uranium salts are powerful protoplasmic poisons, of even greater toxicity than arsenic, their action, however, being slower. A characteristic symptom of poisoning by uranium is the presence of sugar in the urine. Uranium nitrate is the salt generally preferred for therapeutic use.

**URANII NITRAS.**

URANIUM NITRATE.

*Synonyms.*—Uranyl Nitrate; Uranic Nitrate.

Uranium nitrate,  $\text{UO}_2(\text{NO}_3)_2, 6\text{H}_2\text{O}$ , may be prepared from pitchblende by treating the finely powdered mineral with concentrated nitric acid, and removing from the solution by appropriate treatment the various other metals associated with it, such as barium, bismuth, lead, iron, zinc, radium, polonium, etc. The purified solution of uranium nitrate finally obtained is evaporated to crystallisation.

It occurs in the form of lemon-yellow, rhombic prisms, greenish-yellow by reflected light, odourless, superficially efflorescent in dry air, and has radio-active properties. Readily soluble in water (about

2 in 1), alcohol, and ether. The solutions have a bitter, astringent, styptic taste without any metallic after-taste. It melts in its water of crystallisation at  $59.5^{\circ}$ , and the liquid boils at  $118^{\circ}$ . On further heating, it is decomposed, giving off nitric acid and leaving the reddish-yellow trioxide,  $\text{UO}_3$ , and, at a still higher temperature, dark green oxide,  $\text{U}_3\text{O}_8$ . It should be clearly soluble in water, alcohol, and solution of ammonium carbonate in excess. The aqueous solution should neither be precipitated nor rendered turbid by hydrogen sulphide (absence of other metals), and should give no odour of ammonia on heating with sodium hydroxide in excess. It is reduced to the uranous salt by hydrogen sulphide, and by alcohol, ether, and other organic matter in sunlight.

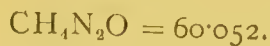
Solutions of uranium nitrate are poisonous, and produce glucosuria when injected subcutaneously, even in small doses. They should be used with the greatest caution (see under *Uranii Acetas*). The action of uranium salts in producing glucosuria is attributed to their effect in retarding the reduction of the oxyhæmoglobin of the blood, and thus lessening oxidation in the tissues. They have been employed internally in diabetes and cancer, but there is little or no ground for attributing to them any beneficial action in these diseases. Uranium nitrate is best administered in dilute solution in mixture form.

*Dose.*— $\frac{1}{2}$  to 3 decigrams (1 to 5 grains).

*NOTES.*—Uranium nitrate should be kept in well-stoppered bottles protected from the light. The radio-activity of uranium nitrate may be shown by placing a crystal on a material impervious to light, such as black paper or aluminium, and laying on a photographic plate, when the position and shape of the crystal will be recorded after a short time on development. Or if a crystal be held at a short distance from a charged electroscope this will lose its charge more quickly than it would normally. If the salt, however, be recrystallised from ether this property is lost, showing that the activity is due to some other substance ordinarily present. Solution of uranium nitrate is prepared by dissolving 5 of the salt in sufficient distilled water to produce 100 by volume; it is used as a test solution.

## UREA.

UREA.



*Synonym.*—Carbamide.

Urea,  $\text{CO}(\text{NH}_2)_2$ , the diamide of carbonic acid, is the chief form in which the nitrogen of the effete tissues is excreted from the human organism, and is present in urine to the extent of about  $2\frac{1}{2}$  to 3 per cent. It may be obtained by evaporating urine to about one-eighth of its bulk, cooling, and mixing with about an equal volume of strong nitric acid; the urea nitrate crystallises and is collected on a filter, washed with ice-cold water till the washings

are but slightly coloured, dissolved in boiling water and mixed with precipitated barium carbonate, rubbed to a cream with water as long as a fresh addition of barium carbonate causes effervescence; this is filtered, and the filtrate evaporated on a water-bath to dryness, the urea extracted by means of strong alcohol, and crystallised by evaporation. Urea was the first example of an animal product being prepared artificially from mineral sources. It may be prepared synthetically by heating to dull redness a mixture of 56 parts of dried potassium ferrocyanide and 28 parts of manganese dioxide. The cooled residue is treated with cold water, filtered, and the solution decomposed with 41 parts of ammonium sulphate. It is then evaporated to dryness on the water-bath, and the residue extracted by strong alcohol, and crystallised.

It occurs in the form of colourless, transparent, prismatic crystals, almost odourless, having a cooling saline taste, somewhat hygroscopic. Soluble in water (1 in 1), more readily in hot water; in alcohol (1 in 7), in boiling alcohol (1 in 1), insoluble in ether or chloroform. When heated, it fuses at  $132^{\circ}$ , evolving much ammonia and some ammonium cyanate; kept for some time at  $150^{\circ}$ , most of it is converted into biuret; when the temperature is raised to  $170^{\circ}$  the biuret again evolves ammonia, and is converted into cyanuric acid. Heated with water under pressure it is converted into ammonium carbonate. Urea is not alkaline, but it is a weak base, and, though a diamide, forms salts like a monacid base; these are acid to litmus. By hydrolysis it yields ammonia and carbon dioxide, hence the ammoniacal odour of putrefying urine. Dissolved in pure water it keeps unchanged for a long time. Nitric and oxalic acids added to strong solution of urea give crystalline precipitates of nitrate and oxalate.

Urea has the property of dissolving uric acid calculi, and is used as a diuretic in gout and rheumatism. It is indeed one of the most efficient diuretics we possess, but the value of diuretics in nephritis must remain doubtful, since they so greatly increase the work of the kidneys as measured by the oxygen absorption and carbonic acid output. Urea was formerly recommended in the treatment of many forms of tuberculosis; doses of 12 decigrams (20 grains), increased to ten times that quantity, were given three times daily. This treatment was first started for the reason that tubercle is rarely associated with gout; the treatment is, however, now being generally given up. Urea is given in solution in mixture form, or it may be enclosed in cachets. A sterilised solution in distilled water (1 in 6) has been used for hypodermic injection.

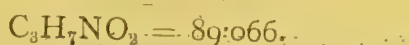
*Dose.*— $\frac{1}{2}$  to 4 grammes (10 to 60 grains).

*NOTES.*—Urea quinate (Urol) and urea salicylate (Ursal) have been used in gout and rheumatism. The quinate occurs in colourless crystals, which are readily soluble in water or alcohol, and is given in doses of 2 to 5 decigrams (3 to 8 grains); the salicylate is more soluble in alcohol than in water, and is given in doses of 6 to 20 decigrams (10 to 30 grains).



## URETHANUM.

URETHANE.



*Synonyms.*—Carbamic Acid Ethyl Ester; Ethyl Carbamate;  
Ethyl-urethane.

Urethane, or ethyl carbamate,  $\text{CO}(\text{NH}_2)\text{OC}_2\text{H}_5$ , may be prepared by acting on urea nitrate with alcohol in excess, in a sealed tube at a temperature of about  $125^\circ$  for several hours. The resulting crystalline mass is dissolved in just a sufficiency of water, and the solution shaken out several times with ether. The ether is recovered, and the residue distilled, and recrystallised from water. It is also formed by the action of solution of ammonia on ethyl carbonate at  $100^\circ$ , and by direct union of cyanic acid with alcohol.

It occurs in the form of colourless prismatic crystals or scales, odourless, and having a cooling, saline, slightly bitter taste. Soluble in water (1 in 2), in alcohol (1 in 1), in ether (2 in 3), in chloroform (1 in  $1\frac{1}{2}$ ), in glycerin, and in oils. The solutions are neutral. Melting-point,  $48^\circ$  to  $50^\circ$ ; boiling-point,  $180^\circ$ , subliming without decomposition. It burns with a slightly luminous, bluish flame, leaving no residue (absence of inorganic impurities). When boiled with solution of potassium hydroxide it yields potassium carbonate, alcohol, and ammonia. Heated with ammonia it gives alcohol and urea. On gently heating 1 gramme with five times its weight of sulphuric acid carbon dioxide is evolved, alcohol and ammonium acid sulphate being formed at the same time. If 5 decigrams, dissolved in 5 mls of water, be warmed with 1 gramme of dry sodium carbonate, and 1 centigram of iodine be added, crystalline scales of iodoform will separate on cooling. An aqueous solution (1 in 1) should not give a crystalline precipitate with nitric acid, nor a precipitate with oxalic acid or mercuric nitrate solution (distinction from and absence of urea). The 10 per cent. aqueous solution should give no turbidity with silver nitrate (absence of chlorides), nor, when treated with ferrous sulphate and sulphuric acid, should a brown zone be developed between the two liquids (absence of nitrates).

Urethane is employed as a hypnotic. It produces calm sleep and has no depressant effect on the circulation; its action is said to be uncertain, but this is probably due to the fact that too little was given. Urethane is a safe drug, and no evil effects are to be anticipated even from 4 or 5 grammes. It is much used as an anæsthetic for animals during physiological experiments,  $1\frac{1}{2}$  grammes per kilo of body weight being sufficient to produce deep anæsthesia in the rabbit. Urethane is antagonistic to strychnine, and in poisoning by this drug or in the disease tetanus it may be administered in the largest doses until the convulsions are controlled.

*Dose.*—1 to 2 grammes (15 to 30 grains).

**URGINEA.****URGINEA.**

*Synonym.*—Indian Squill.

Urginea consists of the younger bulbs of *Urginea indica*, Kunth, or of *Scilla indica*, Baker (*Ledebouria hyacinthina*, Roth.), (N.O. Liliaceæ), plants indigenous to India. The bulbs are collected soon after the plant has flowered, and kept in a cool place.

The bulbs of *Urginea indica* are rounded, conical, or pear-shaped, and about the size of an onion. They are whitish in colour and tunicated, the fleshy scales completely enveloping one another. The drug has a bitter acrid taste. The bulbs of *Scilla indica* are smaller than those of *Urginea indica*, pear-shaped and imbricated. The outer scales are brown and dry, but the inner fleshy and yellowish-white. The drug has an unpleasant odour and bitter, acrid taste.

The constituents of urginea appear to be similar to those of squill, viz., the toxic glucosides scillipicrin and scillitoxin, and the inactive glucoside scillin. The carbohydrate sinistrin is probably also present, together with mucilage and calcium oxalate in acicular crystals.

Urginea is official in India and the Eastern Colonies for use in place of squill, and preparations comparable with those of squill are made.

**UVÆ.****RAISINS.**

*Synonym.*—Uvæ Passæ.

Raisins are the dried ripe fruits of the grape vine, *Vitis vinifera*, Linn. (N.O. Ampelidacæ), largely cultivated in Central and Southern Europe, California, and Australia. The raisins are packed in boxes either in bunches or loose, and exported chiefly from the South of Spain.

They are of a purplish-black colour, more or less shrivelled and compressed. Within the thin skin is a soft pulp in which a few hard pear-shaped seeds are embedded. They should be free from any crystalline incrustation of dextrose or potassium acid tartrate.

The chief constituents of raisins are dextrose and potassium acid tartrate in the pulp, and tannin and fixed oil in the seeds. The latter are separated from the raisins used in making galenical preparations, as the fixed oil they contain tends to impart an unpleasant taste.

Raisins are demulcent, nutritive, and mildly laxative. They are sometimes used to prepare mucilaginous drinks and confections.

**UVÆ URSI FOLIA.****UVA URSI LEAVES.**

*Synonyms.*—Uva Ursi; Bearberry Leaves.

Uva ursi leaves are obtained from *Arctostaphylos Uva-ursi*, Sprengel (N.O. Ericaceæ), a small, procumbent, evergreen shrub distributed over the greater part of the northern hemisphere.

The dried leaves are dark green, obovate or spatulate, about 18 millimetres wide, rounded at the apex and tapering at the base into a short petiole. The texture is coriaceous, margin entire, surface glabrous, the upper being deeply impressed with a network of veins. They have no odour, but a very astringent, and somewhat bitter taste.

The chief constituents of the leaves are tannin (6 to 7 per cent.), gallic acid, ellagic acid, arbutin, methyl arbutin, ursone, quercetin, and probably also myricetin. Arbutin,  $C_{12}H_{16}O_7 + \frac{1}{2}H_2O$ , melting-point,  $168^\circ$ , is a crystalline glucoside yielding on hydrolysis dextrose and hydroquinone; a decomposition that takes place during its passage through the body as hydroquinone is excreted in the urine. Ursone,  $C_{30}H_{48}O_8 + 2H_2O$ , crystallises in colourless, tasteless, odourless needles melting at  $265^\circ$ . The drug yields about 3 per cent. of ash.

Bearberry leaves are diuretic and astringent. Their diuretic action is due to the glucoside arbutin, which is largely absorbed unchanged and excreted by the kidneys. A proportion of arbutin is, however, hydrolysed, with formation of hydroquinone; this is also excreted in the urine, to which it gives a greenish-brown colour, darkening on standing, owing to oxidation. During its excretion, arbutin exercises an antiseptic effect on the urinary tract. Bearberry leaves are used in inflammatory diseases of the urinary tract, urethritis, cystitis, etc. They are employed commonly in the form of infusion.

NOTES.—The leaves of other plants have been mistaken for bearberry leaves, notably those of the cowberry, *Vaccinium Vitis-idaea*, and of the box, *Buxus sempervirens*. Bearberry leaves are readily distinguished by the characters already given, but the leaves of the cowberry may be distinguished by the scattered brown dots on the under surface and those of the box by their emarginate apex.

## VACCINUM ANTIBUBONICUM.

### ANTIPLAGUE VACCINE.

*Synonym.*—Haftkine's Prophylactic Fluid.

Antiplague vaccine is prepared by growing the *Bacillus pestis* in broth for four to six weeks, and heating the culture to  $70^\circ$  for three hours. Subsequently the fluid is tested to make certain that it is sterile, and 0.5 per cent. of phenol added. The vaccine contains the bodies of the bacilli as well as the products of their growth, but it is to the former that its immunising properties are due.

Antiplague vaccine is used as a prophylactic for those who may be exposed to plague infection. Immunity commences at about the seventh or eighth day after the injection, and lasts for about three months.

*Dose.*—For adults, 1 to 3 mils; for children, 5 to 50 centimils. The vaccine is injected subcutaneously in the loose tissues of the flank with all aseptic precautions. The injection may be followed



by local swelling and redness and by enlargement of the neighbouring lymphatic glands. There may be also some general malaise with headache and rise of temperature.

### VACCINUM ANTITYPHOSUM.

#### ANTITYPHOID VACCINE.

Antityphoid vaccine may be prepared from virulent cultures of the *Bacillus typhosus* (the virulence being kept up by passage through successive guinea-pigs). A virulent bacillus is grown on peptone-beef broth in flasks at 37° for fourteen to twenty-one days; the flasks are then heated to and maintained at a temperature of 60° for ten to fifteen minutes. Uniform toxicity is obtained by mixing the contents of several flasks and adding, for preservation, one-tenth of its volume of 2·5 per cent. carbolic acid solution. The strength of the vaccine depends on the number of virulent bacilli it contains; the fluid is standardised to contain approximately 1000 millions of bacilli in 1 mil.

Inoculations with the vaccine are used as a prophylactic; the vaccine must not be used for the treatment of cases of typhoid fever. Persons should be inoculated before going to a country where typhoid is prevalent, not during an epidemic, as the inoculation is temporarily followed by an increased susceptibility. This is succeeded by an immunity which is nearly absolute, and which appears to last about two years.

*Dose.*—Two doses of the vaccine separated by an interval of ten days are recommended to be given in order to attain the greatest degree of immunity. For the first dose 5 decimils is injected with aseptic precautions under the skin in the flank or between the shoulders. The injection is followed in three or four hours by some pain and tenderness at the site of injection, and in six or eight hours by slight fever and general malaise. These symptoms disappear in thirty-six hours. A second injection of 1 mil is given after ten days. It is followed by less local reaction, and general symptoms are usually absent.

### VACCINUM ANTISTAPHYLOCOCCICUM.

#### ANTISTAPHYLOCOCCIC VACCINE.

Antistaphylococcic vaccine may be prepared by inoculating nutrient broth with *Staphylococcus aureus*, *S. citreus*, or *S. albus*. After culture for three weeks at a temperature of 37° the culture is sterilised by exposure for twenty minutes to a temperature of 65°. To this sterilised culture 0·5 per cent. of lysol is added as preservative.

The liquid is standardised so that 1 mil contains 0·25 milligram of bacterial bodies, or approximately 2500 millions of cocci.

Antistaphylococcic vaccine is used as a curative agent against

localised staphylococcic infections. Its action is to raise the resistance of the body to this organism; following a dose of the vaccine, there is at first a fall in the staphylococcic-opsonin content of the blood, which is soon succeeded by a marked rise, reaching its maximum in eight to ten days.

Two varieties of antistaphylococcic vaccine are in use: 1. The pure culture of *Staphylococcus aureus*, for use in furunculosis and sycosis. 2. A mixture of pure cultures of *Staphylococcus aureus*, *S. citreus*, and *S. albus* for use in acne. In cases of furunculosis and sycosis, it is, however, usual for a bacteriological examination of the pus to be made, since the condition is not always due to a pure infection of *S. aureus*.

*Dose.*—For the first dose 5 decimils is injected under the skin between the shoulders or in the flank, with the usual aseptic precautions. After ten days a second like dose is given, which after similar intervals may be gradually increased to 2 mils. The dose is diminished if there be too much local reaction around the furuncles or acne spots.

### VACCINUM VACCINIÆ.

CALF VACCINE.

*Synonym.*—Calf Lymph.

Calf vaccine is obtained from healthy calves, which are prepared by shaving the abdomen, with antiseptic precautions, and then vaccinating by incision without drawing blood. In five days the vaccinated surface is washed and freed from crusts, and the contents of the vesicles are collected by means of a Volkmann's spoon, mixed with four times their volume of 50 per cent. glycerin in distilled water, triturated aseptically, and stored in sealed tubes until agar plates show the absence of organisms. Storage for three months in contact with glycerin destroys all non-spore-bearing extraneous organisms. Glycerinated calf lymph is considered the safest for vaccination, and is now generally regarded as preferable to arm-to-arm vaccination.

A more recent process yields vaccine free from extraneous organisms in a few hours. The vesicular material is weighed and well triturated with twice its weight of distilled water until a fine mechanical mixture results. Through the mixture a stream of chloroform vapour and air is aspirated for a few hours, the whole being maintained at a temperature of 20°; the germicidal action of the chloroform is subsequently controlled by multiple cultivation tests. All traces of chloroform are then removed from the vaccine and a proportion of glycerin added. This process avoids the deterioration in the strength of the virus which is coincident with the three months' storage necessary to eliminate extraneous organisms by the action of glycerin.

Calf vaccine should be stored in the dark at a temperature of 10° or less; it deteriorates in potency on keeping.

Vaccine lymph contains the living organism of cowpox (*vaccinia*) which is an attenuated form of the virus of smallpox (*variola*). Inoculation with calf vaccine gives rise to *vaccinia*, and the protective substances formed in the body as a result of this infection confer immunity against the more virulent form of the same organism. The immunity persists for a number of years; it is considered advisable that revaccination should be performed at from ten to fourteen years.

Calf vaccine is usually supplied in capillary glass or leaden tubes.

### VALERIANÆ INDICÆ RHIZOMA.

INDIAN VALERIAN RHIZOME.

*Synonym.*—Indian Valerian.

Indian valerian consists of the dried rhizome and rootlets of *Valeriana Wallichii*, DC. (N.O. Valerianæ), an herbaceous plant indigenous to the temperate Himalayas.

The drug occurs in short, irregular pieces about 5 centimetres long and 6 to 12 centimetres in diameter, marked with transverse ridges and bearing numerous, prominent, circular tubercles, to some of which on the under surface thick rootlets are attached. The upper surface bears the remains of leaves. The rhizome is hard and tough; internally it is greenish-brown in colour. The odour is powerfully valerianaceous.

The chief constituent of Indian valerian is the volatile oil; this probably contains esters of valerianic acid, which gradually decompose, yielding valerianic acid. Resin and free valerianic acid also appear to be present.

This drug closely resembles valerian root in its properties, and is official in India and the Eastern Colonies for use as a carminative and antispasmodic. An ammoniated tincture of Indian valerian is prepared.

### VALERIANÆ RHIZOMA.

VALERIAN RHIZOME.

*Synonyms.*—Valerian; Valerian Root.

Valerian consists of the dried rhizome and roots of *Valeriana officinalis*, Linn. (N.O. Valerianæ), an herbaceous plant widely distributed over Europe and Northern Asia. The drug is obtained in this country from wild and cultivated plants, and is also imported from Germany. It is collected in the autumn, freed from the lateral shoots, which are utilised for the propagation of the plant, washed and dried, the larger ones being sliced longitudinally to facilitate the operation.

The drug consists of a short (2 to 2.5 centimetres), erect conical rhizome of a dull, yellowish-brown colour, to which numerous long



stout roots are attached. Small rhizomes are entire, but large ones are halved, or even quartered; internally they are firm and horny. The roots are about 1.5 to 2 millimetres in diameter, brittle, and usually not much shrivelled.

The drug has a strong, penetrating, disagreeable odour, and a camphoraceous, slightly bitter taste. The odour is gradually developed during the process of drying, and appears to be due to the action of an enzyme ferment on one of the constituents of the volatile oil (bornyl valerianate) with the production of free valerianic (isovaleric) acid. The fresh root is devoid of valerianaceous odour.

Valerian root contains about 1 per cent. of volatile oil, consisting of bornyl valerianate, formate, butyrate, and acetate, associated with l-pinene, l-camphene, terpineol, etc. Free valerianic acid is gradually liberated as mentioned above. Two alkaloids, chatinine and valerianine, are also said to be present. The drug yields about 8 or 9 per cent. of ash if free from adherent earthy matter.

The action of valerian root is virtually that of its volatile oil, the valerianic esters of which have no stimulating action on the psychical functions and the circulation, as was formerly believed, although they possess the usual carminative action of the volatile oils. The action of such malodorous substances as valerian is generally attributed to the mental effect produced by their unpleasant odour and taste. Valerian is used as a carminative and antispasmodic in hysteria and similar nervous manifestations. It is commonly prescribed with ammonia as *Tinctura Valerianæ Ammoniata*, and often in association with the alkali bromides.

NOTE.—English valerian as cultivated in Derbyshire is said to be the produce of *Valeriana officinalis*, var. *Mikanii*, Syme.

## VANILLA.

### VANILLA.

Vanilla consists of the cured full-grown, but unripe fruits of *Vanilla planifolia*, Andrews (N.O. Orchideæ), a climbing plant indigenous to Mexico, but cultivated in Java, Réunion, the Seychelles, etc. The fruit of the vanilla plant, a slender capsule, 15 to 20 centimetres long, is collected in the late autumn when full grown, but just before it ripens, and is then submitted to a process of curing, the details of which vary in the different countries of production, during which the characteristic aroma is developed. The curing of the fruits consists essentially of a slow process of drying in warm air, either artificial or solar heat being utilised for this purpose. The cured fruits, which are dark brown or nearly black in colour, are tied into bundles and packed in tins, in which they gradually become coated ("frosted") with crystals of vanillin.

Commercial vanilla beans are nearly black in colour, 15 to 20 centimetres long, and 6 to 9 millimetres thick. They are of a flattened cylindrical shape, tapering towards each end, wrinkled and flexible, the best varieties being covered with minute, glistening

crystals of vanillin. The interior of the pod contains innumerable minute black seeds embedded in a dark, aromatic, balsamic fluid secreted by papillæ lining the cavity of the fruit.

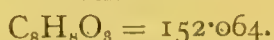
The chief constituent of vanilla is the aromatic, crystalline substance vanillin, which is the aldehyde of methyl-protocatechuic acid; good beans contain from 2 to 2.75 per cent. Other constituents are vanillic acid, resin (4 per cent.), fat (11 per cent.), sugar (10 per cent.), etc. The unripe beans are said to contain coniferin, and two enzymes, one of which converts coniferin into coniferyl alcohol, and the other oxidises the coniferyl alcohol to vanillin. Vanilla yields about 4 or 5 per cent. of ash, and contains about 20 per cent. of moisture.

Vanilla is used as a flavouring agent, usually in the form of Tinctura Vanillæ. Vanilla is much employed in perfumery.

NOTES.—The best variety of vanilla is the Mexican, which occurs in long, narrow, well-frosted pods. Java vanilla is shorter, but is also very aromatic. Bourbon vanilla tapers rather abruptly, and has an odour resembling coumarin. Fruits gathered too early yield pale-coloured vanilla, wanting in aroma. Vanillons are the cured fruits of uncultivated vanilla plants; they are usually of poor quality.

## VANILLIN.

### VANILLIN.



*Synonyms.*—Vanillic Aldehyde; Methyl-protocatechuic Aldehyde.

Vanillin, or methyl-protocatechuic aldehyde,  $\text{C}_8\text{H}_8\text{OHOCH}_2\text{COH}$ , is the odorous principle of vanilla pods, *Vanilla planifolia*, Andrews (N.O. Orchideæ), in which it occurs to the extent of about 2 per cent.; it is also found naturally in Siam benzoin, balsams of Peru and tolu, etc. It is produced synthetically on a large scale from eugenol, by oxidation with ozone, and also from coniferin, a crystalline glucoside found in the cambium of most conifers.

It occurs in the form of white crystalline needles or colourless prisms having the intense odour and taste of vanilla, and an acid reaction. The natural substance has the finer flavour. Soluble with difficulty in cold water; easily in boiling water; very easily in alcohol, ether, chloroform, carbon bisulphide, fatty and volatile oils, glycerin, also in aqueous solutions of alkali hydroxides, forming compounds from which the vanillin may be reprecipitated by the addition of acids. It is completely extracted from its solution in ether by shaking with saturated, aqueous solution of sodium bisulphite, from which vanillin may be reprecipitated by sulphuric acid. The aqueous solution is coloured blue by ferric chloride, becoming brown on boiling; from the liquid on cooling, a white precipitate of dihydro-divanillin separates. Melting-point,  $80^\circ$  to  $81^\circ$ . Boiling-point,  $285^\circ$ . It distils in a current of carbon dioxide without decomposition. On complete ignition it leaves no residue. The aqueous solution gives with lead acetate a white precipitate of a lead

compound soluble in hot water, from which it separates on cooling, in scales. If vanillin be warmed with concentrated alcoholic solution of sodium hydroxide, and chloroform be added, no odour of phenyl isocyanide should be developed on further warming (absence of acetanilide). By the action of nascent hydrogen it is converted into vanillin-alcohol,  $C_8H_{10}O_3$ ; by oxidation into vanillic acid,  $C_8H_8O_4$ , which is sometimes regarded as being the same substance as vanillin, but erroneously so as the formula shows. Vanillic acid is odourless, and does not form the crystallisable aldehyde compound with sodium bisulphite. The acid is also produced when vanillin (vanillic aldehyde) is exposed to moist air. On fusion with potassium hydroxide, protocatechuic acid,  $C_6H_3(OH)_2, COOH$ , results. Vanillin, with double the quantity of pyrogallol, dissolved in a little alcohol gives on warming with hydrochloric acid a blue-violet colouration; with phloroglucin in place of pyrogallol a fiery-red colouration is produced, this being the well-known Günzberg's test for free hydrochloric acid in the stomach contents. The reaction is sensitive to 0.05 per cent. of free hydrochloric acid.

Vanillin is subject to much adulteration—to the extent of 60 per cent. or more—the usual adulterants being benzoic acid, boric acid, acetanilide, coumarin, and more recently terpin hydrate. Being liable to deterioration from oxidation it should be kept in well-closed bottles in a cool place and protected from light. It is extensively used in the manufacture of vanilla essences for confectionery, and in perfumery, but is rarely used in medicine except as a flavouring agent.

### VAPOR ACIDI HYDROCYANICI.

#### HYDROCYANIC ACID INHALATION.

Diluted Hydrocyanic Acid	...	...	10 to 20.00
Cold Water	...	...	80.00

Mix the acid with the water.

Quantity sufficient for one inhalation, 5 mils (75 minims).

This inhalation is used to lessen irritability of the respiratory passages and allay cough.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

### VAPOR AMMONII CHLORIDI.

#### AMMONIUM CHLORIDE INHALATION.

Strong Solution of Ammonia	...	...	12.50
Distilled Water	...	...	87.50
Hydrochloric Acid, a sufficient quantity.			

Mix the strong solution of ammonia with the water, and place the liquids in a suitable apparatus, so that air drawn through it will pass first through the solution of ammonia and then through the hydrochloric acid, the resulting ammonium chloride being purified before inhalation by passing it through water or a moist sponge.



Ammonium chloride inhalation is used in catarrh of the respiratory passages and eustachian tube.

### VAPOR BENZOINI.

#### BENZOIN INHALATION.

Compound Tincture of Benzoin	...	...	0.50
Water at 60°	...	...	100.00

Mix the tincture with the water.

Quantity sufficient for one inhalation, 600 mils (1 pint).

Benzoin inhalation is used in chronic bronchitis, and in pharyngitis and laryngitis.

### VAPOR CHLORI.

#### CHLORINE INHALATION.

Chlorinated Lime	...	...	100.00
Cold Water, a sufficient quantity.			

Add sufficient water to the chlorinated lime to moisten it. Quantity of chlorinated lime sufficient for one inhalation, 56 grammes (2 ounces).

Chlorine inhalation is used in phthisis, in ozæna, and chronic bronchitis with offensive sputum.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

### VAPOR CHLOROFORMI COMPOSITUS.

#### COMPOUND CHLOROFORM INHALATION.

*Synonym.*—A. C. E. Mixture.

Alcohol	...	...	16.00
Chloroform	...	...	32.00
Purified Ether, sufficient to produce	...	...	100.00

Mix.

Compound chloroform inhalation is used as a general anæsthetic. It is considered safer than pure chloroform when deep and prolonged anæsthesia is required. The alcohol has been shown to prevent some of the fall of blood pressure caused by the chloroform (see Chloroformum).

### VAPOR CONIINÆ.

#### CONIINE INHALATION.

Conium Juice	...	...	30.00
Solution of Potash	...	...	7.50
Distilled Water, sufficient to produce	...	...	100.00

Mix the juice of conium and solution of potash, and add the water.

Quantity sufficient for one inhalation, 12 decimils (20 minims), which is placed on a sponge in a suitable apparatus so that the vapour of hot water passing over it can be inhaled.

Coniine inhalation is used to relieve cough in bronchitis, whooping-cough, etc.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

**VAPOR CREOSOTI.****CREOSOTE INHALATION.**

Creosote ...	...	...	...	...	...	0·25
Boiling Water ...	...	...	...	...	...	100·00

Mix the creosote with the boiling water.

Quantity sufficient for one inhalation, 240 mils (8 fluid ounces), which is placed in such an apparatus that the air to be inhaled first passes through the solution.

Creosote inhalation is used in phthisis and foetid bronchitis. It is now more commonly administered by dry inhalation, as in the case of Vapor Iodi Etherealis. It may also be mixed with an equal volume of spirit of chloroform for inhalation.

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

**VAPOR CUBEÆ.****CUBEÆ INHALATION.**

Oil of Cubebs ...	...	...	...	...	8·00
Magnesium Carbonate, light ...	...	...	...	...	4·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Mix the oil with the magnesium carbonate, and add the water.

Quantity sufficient for one inhalation, 4 mils (1 fluid drachm), to be added to 1 pint of water at 60° for each inhalation.

Cubeb inhalation is used in chronic bronchitis.

**VAPOR EUCALYPTI.****EUCALYPTUS INHALATION.**

Oil of Eucalyptus ...	...	...	...	...	4·00
Magnesium Carbonate, light ...	...	...	...	...	2·00
Distilled Water, sufficient to produce	...	...	...	...	100·00

Mix the oil with the magnesium carbonate, and add the water.

Quantity sufficient for one inhalation, 4 mils (1 fluid drachm), to be added to 1 pint of water at 60° for each inhalation.

Eucalyptus inhalation is employed in nasal catarrh, phthisis, chronic bronchitis, asthma, etc.

**VAPOR EUCALYPTI COMPOSITUS.****COMPOUND EUCALYPTUS INHALATION.**

*Synonym.*—Anti-Catarrhal Salts.

Carbolic Acid ...	...	...	...	...	16·50
Oil of Eucalyptus ...	...	...	...	...	16·50
Oil of Pine ...	...	...	...	...	8·25
Strong Solution of Iodine ...	...	...	...	...	8·25
Camphor ...	...	...	...	...	16·50
Ammoniated Alcohol ...	...	...	...	...	34·00

Dissolve the camphor, carbolic acid, and oils in the alcohol, and

add the strong solution of iodine. Saturate pine sawdust or peat dust with the mixture, and preserve in glass-stoppered bottles.

Compound eucalyptus inhalation is used in coryza, hay fever, and influenza.

### VAPOR IODI.

#### IODINE INHALATION.

Tincture of Iodine	...	...	...	...	12'00
Distilled Water	...	...	...	...	90'00

Mix the tincture of iodine with the distilled water.

Quantity sufficient for one inhalation, 30 mils (1 fluid ounce), which is to be placed in an apparatus to which gentle heat can be applied, and the vapour that arises inhaled.

Iodine inhalation was formerly used in phthisis and chronic bronchitis. The dry inhalation is now usually preferred (see Vapor Iodi Etherealis).

NOTE.—This preparation was official in the British Pharmacopœia, 1885.

### VAPOR IODI ETHEREALIS.

#### ETHEREAL INHALATION OF IODINE.

Iodine	...	...	...	...	0'05
Ether	...	...	...	...	25'00
Carbolic Acid	...	...	...	...	25'00
Creosote	...	...	...	...	12'50
Alcohol	...	...	...	...	37'50

Mix the iodine, carbolic acid, and creosote, with the ether and alcohol.

Quantity sufficient for one dry inhalation, 6 decimils (10 minims).

Ethereal inhalation of iodine is used on the absorbent pad or sponge of an oro-nasal respirator inhaler. It is employed in phthisis and chronic bronchitis with foetid expectoration.

### VAPOR OLEI PINI.

#### PINE OIL INHALATION.

Oil of Pine	...	...	...	...	10'00
Magnesium Carbonate, light	...	...	...	...	5'00
Distilled Water, sufficient to produce	...	...	...	...	100'00

Mix the oil with the magnesium carbonate and add the water.

Quantity sufficient for one inhalation, 4 mils (1 fluid drachm), which is to be placed with 10 fluid ounces of cold water and 10 fluid ounces of boiling water in an apparatus so arranged that the air to be inhaled may pass through the solution.

Pine oil inhalation is used as a mild antiseptic in catarrhal affections of the respiratory passages.

NOTES.—A similar inhalation was official in the British Pharmacopœia, 1885, under the name Vapor Olei Pini Sylvestris.



**VERATRI ALBI RHIZOMA.****WHITE HELLEBORE RHIZOME.**

White hellebore rhizome is obtained from *Veratrum album*, Linn. (N.O. Liliaceæ), an herbaceous plant common in the mountains of Central and Southern Europe. It is usually collected in the late summer, freed from the leaves, and dried entire, but sometimes the roots are also cut off, a proceeding which is not to be recommended.

The rhizome, which is erect, about 7 centimetres long and 20 millimetres thick, is usually simple, though sometimes branched in the upper part, and crowned with the shrivelled remains of numerous leaves. It is generally enveloped in dull grey or yellowish, long, stout roots, which tend to shrivel longitudinally. The interior of the rhizome is whitish and compact, the transverse section exhibiting a large stele traversed by numerous irregularly disposed bundles. It has a bitter, acrid taste, but though nearly odourless the powder is strongly sternutatory.

White hellebore contains several alkaloids amounting in all to 0.5 to 1.0 per cent. Of these the most toxic is protoveratrine, which is a powerful sternutatory; jervine is less active, whilst rubijervine and pseudojervine are inactive; whether protoveratridine occurs pre-formed in the drug is doubtful. Comparative experiments have shown that the roots are in no way inferior in activity to the rhizome. Protoveratrine differs from veratrine in that it does not prolong muscular contraction, and is much more poisonous on sensory terminations. Its action closely resembles that of aconitine.

White hellebore was formerly used internally in dropsy and other disorders, and externally as a parasiticide in scabies, etc. It is now rarely employed in medicine, but the powdered rhizome is used as an insecticide and to keep moths away from furs and woollen materials.

**VERATRINA.****VERATRINE.**

Veratrine, so-called, is a mixture of alkaloids, of variable composition, obtained from cevadilla, the dried ripe seeds of *Schænocaulon officinale*, A. Gray (N.O. Liliaceæ). It may be obtained by exhausting the powdered seeds with alcohol, concentrating the resulting tincture so long as no deposit forms, and pouring while hot into twelve times its volume of cold distilled water, filtering through calico, and washing the residue until ammonia ceases to cause precipitation. To the filtrate ammonia is added in slight excess, the solution allowed to precipitate completely, the precipitate collected and washed. The moist precipitate is then suspended in water, and dissolved by gradual addition of hydrochloric acid, the acid solution decolourised by animal charcoal, filtered, and precipitated by ammonia in slight excess. The precipitate is finally collected, washed, dried between filtering paper, and then by warming.

It occurs in the form of white or greyish-white, pulverulent masses, which are amorphous, odourless, and have a very persistent,

bitter, and intensely acrid taste, followed by a sensation of numbness. The powder causes intense irritation of the nasal mucous membrane, and excites violent sneezing. Slightly hygroscopic in moist air. Almost insoluble in cold water; soluble in boiling water (1 in 1000), in alcohol (1 in 3), in ether (1 in 6), in chloroform (1 in 3), sparingly in glycerin; in olive oil (about 1 in 80), freely in diluted acids, but leaving slight traces of an insoluble, brown, resinous body; very soluble in benzene and in amyl alcohol, insoluble in petroleum benzin. The alcoholic solution is alkaline to litmus paper. Its melting-point is ill-defined, and lies somewhere between  $145^{\circ}$  and  $155^{\circ}$ ; it melts to a yellow liquid, and, on further application of heat, burns away, leaving no residue (absence of mineral matter). It dissolves in nitric acid, forming a yellow solution. With hydrochloric acid, on warming, it dissolves with production of a blood-red colour, lasting several days. With sulphuric acid a yellow solution results, subsequently acquiring a yellowish-green fluorescence, intensified by further addition of acid, the solution slowly changing to bright red, or if warmed, violet-red. The addition of a drop of syrup darkens the red, and gives it a purple colour, becoming blue on exposure to air.

The mixed alkaloids consist chiefly of true veratrine, veratridine, cevadilline, sabadine, and sabadinine. Veratrine (cevadine),  $C_{32}H_{49}NO_9$ , is a crystalline alkaloid which may be decomposed by heating with alcoholic potash into methyl-crotonic acid (tiglic or cevedic acid),  $C_5H_8O_2$ , and an amorphous base, cevine (cevedine); veratridine,  $C_{37}H_{53}NO_{11}$ , is amorphous, and may similarly be decomposed into dimethyl-protocatechuic acid (veratric acid),  $C_9H_{10}O_4$ , and an amorphous base, verine (veratroine), probably identical with cevine; cevadilline (sabadilline) is an amorphous base,  $C_{34}H_{53}NO_8$ ; sabadine,  $C_{29}H_{51}NO_8$ , and sabadinine, are both crystalline bodies.

Veratrine resembles aconitine in its action on the peripheral nerve-endings; applied externally it gives rise to tingling, followed by numbness and coldness, which may be followed by some irritation. Veratrine exerts a characteristic stimulant action on all forms of muscle tissue. This is a direct effect upon the muscle tissue, and is shown in the case of plain muscle by colic-like spasms of the intestine, exaggeration of the movements of the uterus, bladder, bronchioles, etc., and intense vaso-constriction. The vaso-constriction differs from that caused by adrenine in that it affects also the pulmonary, coronary, and cerebral vessels. The heart is first slowed to a slight extent and then quickened, the strength of systole being increased. Veratrine increases the irritability of striped muscle so as to increase the work it is capable of doing. In large doses the muscle-contraction is prolonged, relaxation being long drawn out. Veratrine is rarely used internally. It is applied in the form of ointment or as Oleinatum Veratrinæ for its analgesic properties in neuralgia, especially facial neuralgia, but must not be used where the skin is broken.

*Dose.*—1 to 4 milligrams ( $\frac{1}{70}$  to  $\frac{1}{16}$  grain).

**VIBURNUM.****BLACK HAW.**

Black haw is the dried bark of *Viburnum prunifolium*, Linn. (N.O. Caprifoliaceæ), a shrub or small tree abundant in the Central and Eastern United States.

It occurs in channelled or sometimes quilled pieces seldom exceeding 4 millimetres in thickness. The outer surface of young bark is brownish and smooth, that of old bark dark brownish-grey, deeply fissured and scaly; the inner surface is whitish or brownish, and striated or marked with elongated reticulations. Fracture short and granular. The transverse section exhibits a whitish inner portion containing conspicuous, scattered, comparatively large yellowish groups of sclerenchyma embedded in white parenchyma. Taste bitter and astringent.

The drug contains a bitter glucoside which is soluble in water, 2·5 per cent. of resin, tannin, and a non-volatile alkaloid which has not yet been isolated in a pure state; the bark also contains valerianic acid. Petroleum spirit extracts about 11 per cent. of a viscous, dark brown substance, which is incompletely soluble in alcohol.

Black haw depresses the medulla and spinal cord without affecting the higher cerebral centres; therefore it depresses respiration and induces a large drop in blood pressure. It is used for its supposed sedative effects on the uterus, to prevent threatened abortion, and to control hæmorrhage. Good results have followed its administration for asthma, dysmenorrhœa, and spasmodic affections of plain muscle. It is official in India and the Eastern and North American Colonies, and a liquid extract is prepared.

*Dose.*—1 to 2 grammes (15 to 30 grains).

*NOTES.*—*Viburnum Prunifolium*, U.S.P., may consist of the dried bark of the root of *Viburnum prunifolium*, Linn., or of *V. Lentago*, Linn. *Viburnum Opulus*, U.S.P., consists of the dried bark of *V. Opulus*, Linn.

**VINUM ALOES.****ALOES WINE.**

*Synonym.*—Wine of Aloes.

Socotrine Aloes, crushed	...	...	...	3·75
Cardamom Seeds, bruised	...	...	...	0·50
Ginger, in coarse powder	...	...	...	0·50
Sherry, sufficient to produce	...	...	...	100·00

Macerate the solid ingredients with 100 of sherry for seven days in a closed vessel, with occasional agitation; then filter, and add sufficient sherry to make up the required volume.

Wine of aloes is used as a bitter and laxative.

*Dose.*—4 to 8 mls (1 to 2 fluid drachms).

*NOTE.*—*Vinum Aloes* was official in the British Pharmacopœia, 1885.



**VINUM ANTIMONIALE.**

## ANTIMONIAL WINE.

Tartarated Antimony ... ..	0.457
Distilled Water, boiling ... ..	5.028
Sherry, sufficient to produce ... ..	100.00

Add the tartarated antimony to the distilled water, dissolve, and add sufficient sherry to make up the required volume.

Antimonial wine is a convenient solution of tartar emetic; it is used as a diaphoretic and expectorant in pneumonia, croup, and bronchitis, and, in virtue of its action on metabolism, it is employed like arsenic to improve the nutrition of the skin in acute and chronic skin diseases.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  mils (10 to 30 minims); as an emetic, 8 to 15 mils (2 to 4 fluid drachms).

*NOTE.*—Vinum Antimonii, U.S.P., is prepared by dissolving 0.4 of tartarated antimony in 6.5 of boiling distilled water, adding a mixture of 17.5 of 95 per cent. alcohol, and 75.5 of white wine, mixing well, allowing to cool, then filtering and passing sufficient white wine through the filter to produce 100 by volume average dose, 1 mil (15 minims).

**VINUM AURANTII.**

## ORANGE WINE.

Orange wine is prepared by the fermentation of a saccharine solution containing fresh, bitter orange peel.

It is a golden, sherry-coloured liquid, with a taste and aroma resembling bitter orange peel. It should contain from 10 to 12 per cent. by volume of ethyl hydroxide, and be but slightly acid to litmus. When a mixture of 50 mils of orange wine and 50 mils of water, acidulated with 5 mils of normal solution of sulphuric acid, is distilled, the distillate (after the rejection of the first 10 mils) shaken with ether, the ethereal liquid separated, and its ether removed by evaporation, the residue should not yield a violet colouration when solution of ferric chloride is added (absence of salicylic acid). It should yield not more than the slightest reactions with the tests for sulphites.

Orange wine is used as a vehicle for cod-liver oil, quinine, etc., and enters into the composition of Vinum Ferri Citratis and Vinum Quininae Citratis.

**VINUM AURANTII DETANNATUM.**

## DETANNATED ORANGE WINE.

Orange Wine ... ..	100.00
Gelatin, in No. 100 powder ... ..	0.15

Macerate for twenty-four hours at a temperature not exceeding  $15.5^{\circ}$ , with frequent agitation, and afterwards decant.

Detannated orange wine is used in the preparation of wines containing alkaloids and other substances incompatible with tannin.

**VINUM CINCHONÆ.**

## CINCHONA WINE.

Elixir of Cinchona	...	...	...	...	12·50
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Detannated Sherry, sufficient to produce	...	...	...	...	100·00
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Mix the elixir of cinchona with the detannated sherry.

Cinchona wine is used as a bitter.

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**VINUM CINCHONÆ FERRATUM.**

## FERRATED CINCHONA WINE.

Iron and Ammonium Citrate	...	...	...	...	0·50
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Cinchona Wine...	...	...	...	...	100·00
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Dissolve the iron and ammonium citrate in the cinchona wine, and filter.

Ferrated cinchona wine is a chalybeate, and is used as a "bitter tonic."

*Dose.*—15 to 30 mls ( $\frac{1}{2}$  to 1 fluid ounce).

**VINUM COCÆ.**

## COCA WINE.

Elixir of Coca	...	...	...	...	12·50
----------------	-----	-----	-----	-----	-------

Detannated Sherry, sufficient to produce	...	...	...	...	100·00
--	-----	-----	-----	-----	--------

Mix the elixir of coca with the detannated sherry.

Coca wine acts mainly in virtue of its cocaine. It excites the whole of the brain, especially the motor areas, and causes a sense of exhilaration and an increased capacity for physical work. Very large doses cause restlessness, anxiety, tremors, hallucinations, and even convulsions; respiration is rapid, the heart is quicker, and blood pressure rises. Coca wine differs from tea, in that the former beverage acts mainly on the motor areas and the latter on the psychical. It may be employed in any condition in which it is desirable to "rouse" the cerebral hemispheres.

*Dose.*—8 to 15 mls (2 to 4 fluid drachms) with water.

NOTE.—Vinum Cocæ, U.S.P., is prepared by dissolving 6·5 of sugar in 50 of red wine, adding 7·5 of 95 per cent. alcohol, and 6·5 of fluid extract of coca, making up the volume to 100 with red wine, and filtering after standing for two days; average dose, 16 mls (4 fluid drachms).

**VINUM COLCHICI.**

## COLCHICUM WINE.

Colchicum Corm, in No. 20 powder	...	...	...	...	20·00
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Sherry	...	...	...	...	100·00
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Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Colchicum wine is given often with antacids and saline purgatives in gout.

*Dose.*— $\frac{1}{2}$  to 2 mls (10 to 30 minims).

**VINUM COLCHICI SEMINUM.**

## COLCHICUM SEED WINE.

Colchicum Seeds, in fine powder	...	...	10'00
Detannated Sherry	...	...	100'00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Colchicum seed wine is used similarly to Vinum Colchici.

*Dose.*— $\frac{1}{2}$  to 2 mils (10 to 30 minims).

*NOTES.*—Vinum Colchici Seminis, U.S.P., is prepared by mixing 10 of fluidextract of colchicum seed with 15 of 95 per cent. alcohol and 75 of white wine, and filtering after standing for two days. Average dose, 2 mils (30 minims). Fluidextractum Colchici Seminis (1 in 1) is prepared by exhausting colchicum seed, in No. 50 powder, with 63 per cent. alcohol, and adjusting the strength of the product so that it shall contain 0.5 per cent. w/v of colchicine.

**VINUM CONDURANGO.**

## CONDURANGO WINE.

Liquid Extract of Condurango	...	...	10'00
Detannated Sherry, sufficient to produce	...	...	100'00

Mix the sherry with the liquid extract.

Condurango wine was introduced as a cancer cure, and wonderful results were at first reported, as with all such "cures." It is no longer used in cancer, but is given to a small extent as a gastric sedative.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**VINUM ERGOTÆ.**

## ERGOT WINE.

Liquid Extract of Ergot	...	...	20'00
Alcohol	...	...	5'00
Detannated Sherry, sufficient to produce	...	...	100'00

Mix the liquids and set the mixture aside for two days; then filter through paper.

Ergot wine is used when a more palatable preparation than the liquid extract or tincture is required.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

*NOTE.*—This preparation corresponds to Vinum Ergotæ, U.S.P.

**VINUM FERRI.**

## IRON WINE.

Iron, in wire	...	...	5'00
Sherry	...	...	100'00

Allow the iron wire to be almost, but not quite, immersed in the sherry for thirty days, in a closed vessel; shake frequently, occasionally removing the stopper, and finally filter.



Iron wine is used as a mild chalybeate for children and delicate persons.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

*NOTES.*—This preparation varies considerably in strength, and deteriorates on keeping. Good samples contain about 0.20 per cent. of iron. Vinum Ferri, U.S.P., is made with iron and ammonium citrate (see Notes under Vinum Ferri Citratis).

### VINUM FERRI CITRATIS.

#### IRON CITRATE WINE.

Iron and Ammonium Citrate ... ..	1.83
Orange Wine, sufficient to produce ... ..	100.00

Add the iron and ammonium citrate to the orange wine, set aside for three days, shaking occasionally, and filter.

Iron citrate wine is a pleasant form in which to administer iron and ammonium citrate.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

*NOTES.*—Vinum Ferri, U.S.P., was formerly known as Vinum Ferri Citratis. It is prepared by dissolving 4 of iron and ammonium citrate in 70 of white wine, adding 6 of tincture of sweet orange peel and 10 of syrup, making up the volume to 100 with white wine, and filtering after standing for two days; average dose, 8 mls (2 fluid drachms).

### VINUM FERRI ET QUININÆ.

#### IRON AND QUININE WINE.

Iron and Quinine Citrate ... ..	2.00
Detannated Sherry, sufficient to produce ... ..	100.00

Add the iron and quinine citrate to the sherry, set aside for three days, shaking occasionally, and filter.

Iron and quinine wine is used as a bitter and hæmatinic.

*Dose.*—4 to 15 mls (1 to 4 fluid drachms).

*NOTE.*—Vinum Ferri Amarum, U.S.P., is prepared by dissolving 5 of iron and quinine citrate in 50 of white wine, adding 6 of tincture of sweet orange peel and 30 of syrup, making up the volume to 100 with white wine, and filtering after standing two days; average dose, 8 mls (2 fluid drachms).

### VINUM IPECACUANHÆ.

#### IPECACUANHA WINE.

Liquid Extract of Ipecacuanha ... ..	5.00
Sherry ... ..	95.00

Mix the liquid extract with the sherry, set aside for forty-eight hours, and filter.

Ipecacuanha wine is a valuable expectorant, acting reflexly on the bronchial secretion through the stomach. There is no evidence to show that it is absorbed. It is used especially in children for croup, whooping-cough, etc.

*Dose.*— $\frac{1}{2}$  to  $2\frac{1}{2}$  mls (10 to 30 minims), as an expectorant; as an emetic, 15 to 23 mls (4 to 6 fluid drachms).

NOTES.—This preparation keeps better if heated to boiling-point, in order to destroy the oxydase which appears to be the cause of the deposit which forms in the unsterilised wine. Vinum Ipecacuanhæ, U.S.P., is prepared by mixing 10 of fluidextract of ipecac with 10 of 95 per cent. alcohol and 80 of white wine, and filtering after standing for two days; average dose, 1 mil (15 minims).

### VINUM KOLÆ.

#### KOLA WINE.

Elixir of Kola	...	...	...	...	12.50
Detannated Sherry, sufficient to produce	...	...	...	...	100.00

Mix the elixir of kola with the sherry.

Kola wine is used as a stimulant in nervous headache and migraine. Its action is due to caffeine.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

### VINUM OPII.

#### OPIUM WINE.

Extract of Opium	...	...	...	...	5.00
Cinnamon Bark, bruised	...	...	...	...	0.75
Cloves, bruised	...	...	...	...	0.75
Detannated Sherry, sufficient to produce	...	...	...	...	100.00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Opium wine is used as a gastro-intestinal carminative and sedative. It is sometimes prescribed without aromatics for use in eye-lotions.

*Dose.*— $\frac{1}{2}$  to 2 $\frac{1}{2}$  mils (10 to 40 minims).

NOTES.—This preparation was official in the British Pharmacopœia, 1885. Vinum Opii, U.S.P., is prepared by macerating 10 of granulated opium and 1 each of Saigon cinnamon and cloves with 75 of a mixture of 15 of 95 per cent. alcohol and 85 of white wine, for seven days, with occasional agitation, then filtering and passing sufficient of the menstruum through the filter to produce 100 by volume; average dose, 5 decimils (8 minims).

### VINUM PEPSINI.

#### PEPSIN WINE.

Pepsin	...	...	...	...	...	3.50
Hydrochloric Acid	...	...	...	...	...	1.25
Glycerin	...	...	...	...	...	5.00
Detannated Sherry, sufficient to produce	...	...	...	...	...	100.00

Mix the acid with 90 of the sherry, and add the mixture gradually, with constant stirring, to the pepsin and glycerin, previously rubbed together in a mortar. Set aside for a week, then filter, and add sufficient sherry to make up the required volume.

Pepsin wine is given at the end of a meal as an aid to digestion.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

**VINUM QUININÆ.**

## QUININE WINE.

Quinine Hydrochloride	...	...	...	0·228
Orange Wine	...	...	...	100·00

Dissolve the quinine hydrochloride in the wine, set aside till clear, and filter if necessary.

Quinine wine is taken as a bitter before meals, to stimulate the appetite and therefore indirectly to improve gastric digestion.

*Dose.*—15 to 30 mils ( $\frac{1}{2}$  to 1 fluid ounce).

**VINUM RHÆI.**

## RHUBARB WINE.

Rhubarb Root, in coarse powder	...	...	7·50
Canella Bark, in coarse powder	...	...	0·50
Detannated Sherry, sufficient to produce	...	...	100·00

Macerate for seven days, and proceed as in the case of Tinctura Alstoniæ.

Rhubarb wine is used in dyspepsia associated with constipation.

*Dose.*—4 to 8 mils (1 to 2 fluid drachms).

*NOTE.*—This preparation was official in the British Pharmacopœia, 1885.

**VINUM XERICUM.**

## SHERRY.

Sherry is prepared by the fermentation of the juice of fresh grapes, the fruit of *Vitis vinifera*, Linn. (N.O. Vitaceæ), freed from seeds, stems, and skins.

It is a pale yellowish-brown liquid containing not less than 16 per cent. of ethyl hydroxide by volume. It should be free from salicylic acid as indicated by the application of the ferric chloride test described under Vinum Aurantii.

Sherry is used for preparing several medicated wines, the detannated wine being most suitable for this purpose.

*NOTES.*—Vinum Album, U.S.P., is a dry, white wine, of specific gravity 0·990 to 1·010, and preferably of native origin. Vinum Rubrum, U.S.P., is a dry, red wine, of specific gravity 0·989 to 1·010, and also preferably of native origin.

**VINUM XERICUM DETANNATUM.**

## DETANNATED SHERRY.

Sherry	...	...	...	...	100·00
Gelatin, in No. 100 powder	...	...	...	...	0·15

Macerate for twenty-four hours, at a temperature not exceeding 15·5°, with frequent agitation, and afterwards decant.

Detannated sherry is preferred for the preparation of wines containing alkaloids and other substances incompatible with tannin.



**VIOLA.**

## VIOLET.

*Synonyms.*—Sweet Violet; English Violet.

Violet leaves and petals from *Viola odorata*, Linn. (N.O. Violaceæ), indigenous to Europe and Northern Asia. The plant has an oblique rhizome, and produces long filiform runners.

The leaves are reniform or heart-shaped, obtuse and crenate. The flowers are dark blue, sometimes whitish and bearded, and have a sweet agreeable odour; the odour is destroyed by desiccation, and the degree to which they retain their colour depends on the method of collecting and drying them. They should be gathered before full blown, deprived of the calyx, rapidly dried either in a heated room or in a current of very dry air, and kept in air-tight containers. For pharmaceutical purposes the dark blue flowers alone are used.

Violet flowers yield their odour and slightly bitter taste to boiling water. The plant, especially the rhizome, contains the alkaloid violine, which is combined with malic acid and may be isolated by removing the chlorophyll and fat from the alcoholic extract by ether, boiling the residue with diluted sulphuric acid, adding to the filtrate lead oxide, evaporating, and exhausting the residue with strong alcohol. It occurs as a yellowish, bitter, fusible powder, soluble in water, less so in alcohol, insoluble in ether. The blue colouring matter, which may be extracted from the petals by infusion with water, turns green and afterwards yellow with alkalies, and red with acids. A glucoside, viola-quercitrin, is also a constituent; it may be isolated by exhausting the fresh plant with warm alcohol, removing the alcohol by distillation, and treating the residue with warm distilled water from which it crystallises in fine yellow needles. On boiling with diluted mineral acids the glucoside is split up into quercetin and a fermentable sugar. The activity of the plant is probably due to this glucoside, its products of decomposition, or a ferment associated with it. Salicylic acid has also been obtained from the plant.

Preparations of violet have been used, internally and externally, in the treatment of cancer; for this purpose an infusion of the leaves in boiling water (1 in 5) has been used in doses of 30 to 60 mils (1 to 2 fluid ounces). A syrup of the petals (see *Syrupus Violæ*) and a liquid extract of the fresh leaves (2 in 1) are also used; the latter may be taken in teaspoonful doses or rubbed in locally. There is no trustworthy evidence that the preparations have any effect. The fresh leaves are also prepared as a compress for local application. The root acts as an emetic and cathartic in doses of 30 to 60 grains (2 to 4 grammes).

**VISCUM ALBUM.**

## MISTLETOE.

Mistletoe is an evergreen, diocious parasite, *Viscum album*, Linn. (N.O. Loranthaceæ), which grows on the branches of deciduous trees, chiefly the apple, poplar, plum, etc., forming a pendant bush from 6 to 15 decimetres (2 to 5 feet) in diameter.

The branches are numerous and forked, and covered with a smooth bark of a yellowish-green colour; the leaves are tongue-shaped, entire, opposite, coriaceous-fleshy, very shortly petiolate, and without distinct veins. The fruit is a globular, whitish berry, with a viscid pulp, and appears in winter. The root insinuates its fibres into the woody substance of the tree upon which it grows, and thus derives its nourishment from the plant.

Mistletoe contains mucilage, sugar, a crystallisable acid, a fixed oil, resin, an odorous principle, tannin, various salts and also viscin, a substance which is mainly developed by fermentation, and becomes a yellowish, sticky, resinous mass. Viscin is the chief constituent of birdlime.

Various preparations of the plant are used in medicine, chiefly of the young twigs and leaves. The leaves, when dried, lose 58 to 60 per cent. in weight, and when powdered are given in doses of 15 decigrams (20 grains) in cachets or pills. Mistletoe is supposed to have properties resembling digitalis, and has been used in the treatment of cardiac and other dropsies. The berries are purgative and emetic, and are said to have emmenagogue and ecbotic properties, when given in large doses. When extracted with water, the plant yields about 23 per cent. of extract, of which 10 to 15 decigrams (15 to 20 grains) may be given in the form of pills, with or without tannin; it is also given in the form of syrup. An infusion or decoction, made by boiling 2 ounces of the bruised plant with 10 ounces of water, may be given in tablespoonful doses several times daily. A tincture (1 in 8) prepared with 60 per cent. alcohol from equal parts of the leaves and ripe berries, has been given in doses of 5 to 10 minims (3 to 6 decimils). Alcoholic and ethereal extracts have also been prepared, and a physiological solution of an extract has been used for hypodermic or intravenous injection.

## XYLOL.

### XYLOL.



*Synonyms.*—Xylene; Dimethyl-benzene.

Xylol or dimethyl-benzene,  $\text{C}_6\text{H}_4(\text{CH}_3)_2$ , occurs naturally in petroleum oils. It is a coal-tar hydrocarbon, and may be obtained from the portion of the light oil which distils at  $136^\circ$  to  $141^\circ$ , and is a mixture of meta, para, and ortho-xylol. By shaking the mixture with sulphuric acid of 80 per cent. the meta-xylol is dissolved, and by treating the residue with ordinary strong sulphuric acid the ortho-xylol is extracted, leaving the para-xylol. The o-xylol is converted into a sulphonic acid by the sulphuric acid used, and from this compound the hydrocarbon may be obtained by dilution with water and distillation.

It occurs as a thin, white, mobile liquid, resembling benzol and toluol, and having a peculiar odour. Specific gravity, 0.893. Boil-

ing-point,  $135^{\circ}$  to  $143^{\circ}$ . Solidifying point,  $-28^{\circ}$ . On oxidation, o-xylol yields phthalic acid. With formaldehyde-sulphuric acid it gives an orange-red precipitate (benzol gives a brown and toluol a dark-brown precipitate).

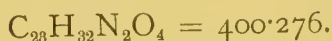
Xylol has been given internally, in a similar way to benzene, for the treatment of whooping-cough and other respiratory affections; it is best administered in capsules or as an emulsion prepared with a mixture of xylol and almond oil. Xylol is used to sterilise catgut ligatures under pressure.

*Dose.* —  $2\frac{1}{2}$  to 5 decimils (4 to 8 minims).

*NOTES.* — Crude xylol is used technically as a solvent and for making azo-dyes; it is also a useful solvent of Canada turpentine or balsam.

## YOHIMBINA.

### YOHIMBINE.



Yohimbine,  $\text{C}_{23}\text{H}_{32}\text{N}_2\text{O}_4$ , is an alkaloid obtained from yohimbehe or yumbehoa bark, *Corynanthe yohimbi*, Schum. (N.O. Rubiaceæ), a plant growing near Kribi, in the southern district of the Cameroons. It may be obtained by exhausting the powdered bark with diluted acetic acid and precipitating the solution thus obtained by means of sodium carbonate. The product is dried, and crystallised from alcohol.

It occurs in the form of white prismatic needles, or as a white amorphous powder, becoming yellow, finally orange-red, on exposure to light, and having a weak odour of benzaldehyde. Almost insoluble in water; soluble in alcohol, methyl alcohol, ether, acetone, or chloroform; slightly soluble in benzene. Its solutions are affected by exposure to light in the same way as the solid substance. Melting-point,  $231^{\circ}$  to  $234^{\circ}$ . On long heating at  $120^{\circ}$  to  $130^{\circ}$  it splits up into water and yohimbin-anhydride. It is a tertiary base, optically inactive, and has certain properties in common with cocaine, its hydrochloride acting as an anæsthetic when applied to the cornea in solution of  $\frac{1}{3}$  to 1 per cent. strength, the anæsthesia lasting for an hour or so. Its effects are more persistent than those of tropacocaine. Yohimbine may be distinguished from cocaine in many ways, the latter being permanent in air and melting at  $98^{\circ}$ . When cocaine is treated with fuming nitric acid and then with alcoholic potash solution it gives no colour reaction, but yohimbine becomes first deep green and then yellowish with nitric acid, and, on the addition of alcoholic potash, cherry-red. Cocaine remains colourless when dissolved in strong sulphuric acid and then treated with chlorinated lime, whilst yohimbine gives an intense orange-red colouration. The former blackens calomel by reduction, the latter does not. In contact with alkalis yohimbine is coloured orange-yellow. It dissolves without colouration in concentrated sulphuric acid. If this solution be treated with potassium bichromate, in the

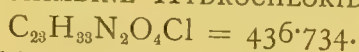


same way as strychnine, it yields streaks with blue-violet edges, which gradually become dirty green. Its solution in concentrated hydrochloric acid is at first colourless, but soon becomes intensely yellow. If a little of the alkaloid be dissolved in 50 per cent. sulphuric acid and a few grains of cane sugar be added, the solution on being warmed in a porcelain capsule on a water-bath will develop a wine-red colour.

Yohimbine is employed hypodermically or by the mouth as a sexual stimulant in impotence; its action as an aphrodisiac is said to be superior to that of strychnine, in that, whilst strychnine increases all reflexes, yohimbine only increases the pelvic reflexes. It has also been used in  $\frac{1}{4}$  to 1 per cent. solution as a local anæsthetic for the eye in place of cocaine. It produces no mydriasis, and does not affect the corneal epithelium. Yohimbine lowers blood pressure by dilating vessels, and increases the depth and frequency of respiration. For use in medicine the hydrochloride of the alkaloid is employed.

### YOHIMBINÆ HYDROCHLORIDUM.

YOHIMBINE HYDROCHLORIDE.



Yohimbine hydrochloride,  $\text{C}_{23}\text{H}_{33}\text{N}_2\text{O}_4\text{HCl}$ , may be prepared by dissolving the base in diluted hydrochloric acid and evaporating the solution to crystallisation.

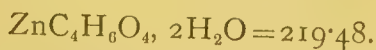
It occurs in the form of colourless crystals, which melt at  $287^\circ$ , slightly soluble in water.

Yohimbine hydrochloride is usually prepared as a 1 per cent. solution, which may be added to mixtures, or injected hypodermically; the salt may also be prescribed in pills, which should be prepared with milk sugar and glycerin of tragacanth.

*Dose.*—3 to 10 decimils (5 to 15 minims) of a 1 per cent. solution.

### ZINCI ACETAS.

ZINC ACETATE.



Zinc acetate,  $\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2, 2\text{H}_2\text{O}$ , may be prepared by neutralising acetic acid with zinc carbonate or oxide, filtering the solution while hot, and crystallising, draining and drying on blotting-paper.

It occurs in the form of thin, soft, white, glistening, translucent plates, or monoclinic crystals of a pearly lustre, and having a faint, acetous odour, and a sharp, disagreeable metallic taste. Soluble in cold water (1 in  $2\frac{1}{2}$ ), in boiling water (4 in 1), in cold alcohol (1 in 40), in boiling alcohol (1 in 3). The aqueous solution reddens blue litmus paper. On exposure the salt gradually effloresces, loses acetic acid, and becomes converted into a basic salt. Old samples may not, therefore, give a clear solution with water. The aqueous

solution of the salt loses acetic acid also on boiling, and deposits the basic salt. When heated, the salt is partially fused, losing water of crystallisation (16·41 per cent.), and acid; at a higher temperature it is decomposed, with evolution of acetone, etc., leaving a residue of zinc oxide. By drying over sulphuric acid at ordinary temperature the salt becomes anhydrous. On gently warming 0·5 gramme with 5 mils of sulphuric acid, no brown colouration should be produced (absence of empyreumatic impurities). It should be free from lead, copper, cadmium, arsenium, iron, aluminium, calcium, magnesium, sodium, potassium, ammonium, chlorides, or sulphates.

Zinc acetate closely resembles the sulphate in its action and uses. It is employed as an astringent lotion in ophthalmia and in the sub-acute stage of gonorrhœa (1 in 200). It is used internally similarly to the other salts of zinc (see *Zinci Oxidum*).

*Dose*.—6 to 12 centigrams (1 to 2 grains); as an emetic, 6 decigrams (10 grains).

*NOTE*.—Zinc acetate should be kept in well-stoppered bottles.

## ZINCI BROMIDUM.

ZINC BROMIDE.

$\text{ZnBr}_2 = 225\cdot32$ .

Zinc bromide,  $\text{ZnBr}_2$ , may be prepared by dissolving zinc in hydrobromic acid, filtering the solution through asbestos or glass wool, concentrating, acidulating with a little hydrobromic acid and drying by the heat of a water-bath; or by stirring 36 of freshly ignited zinc oxide with 150 of water, and gradually adding 288 of 25 per cent. hydrobromic acid or sufficient to give a weak but distinctly acid reaction, and bringing the solution to dryness on a water-bath. It contains 70·97 per cent. of bromine.

It occurs in the form of a white, granular powder, very deliquescent, odourless and having a sharp, saline, and styptic, metallic taste. Soluble in water (4 in 1); in alcohol (2 in 1); also in ether. It sometimes contains basic salt, and is then not completely soluble. The aqueous solution has a slightly acid reaction on litmus paper. When heated to  $394^\circ$  it melts, with partial decomposition, to a colourless or yellowish liquid, boiling at about  $700^\circ$ , and out of contact with air, subliming in needle-shaped crystals. On dissolving 1 gramme in 50 mils of acetic acid, adding 2 grammes of lead oxide, free from chloride and evaporating the mixture to at least 10 mils, the residue should give not more than a slight turbidity after being diluted with 10 mils of distilled water and filtered, on the addition of 2 mils of nitric acid and a few drops of silver nitrate solution (limit of chloride). Zinc bromide should be free from arsenium, iron, aluminium, cadmium, lead, copper, calcium, sulphate or iodide.

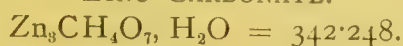
Zinc bromide is used in epilepsy, but is given in too small quantities to exert much beneficial effect. Only a trace of the zinc

is absorbed. It is given in solution in mixture form, preferably with dilute hydrobromic acid. It is incompatible with borax and with alkaline carbonates.

*Dose*.—1 to 3 decigrams (2 to 5 grains).

## ZINCI CARBONAS.

### ZINC CARBONATE.



*Synonyms*.—Zinc Hydroxycarbonate; Hydrated Zinc Carbonate; Zinc Subcarbonate; Precipitated Zinc Carbonate.

Zinc carbonate, or hydroxycarbonate,  $\text{ZnCO}_3(\text{ZnH}_2\text{O}_2)_2, \text{H}_2\text{O}$ , is a mixture or weak combination of carbonate and hydroxide. It may be prepared by slowly adding a solution of 30 of crystallised zinc sulphate in 150 of water to a filtered solution of 32 of crystallised sodium carbonate in 180 of water heated to boiling point, and stirring constantly. After boiling for fifteen minutes the precipitate is allowed to subside. The liquid is then decanted, the precipitate washed with hot water until the washings no longer affect solution of barium chloride, then collected, pressed, and dried at  $50^\circ$ . The formula given for the salt is only approximately correct, as the composition varies under different conditions of production.

It occurs as a dry, white, impalpable, amorphous powder, odourless and tasteless. Insoluble in water or alcohol; soluble in diluted nitric and other mineral acids with effervescence, also soluble in acetic acid, ammonia water, and solution of ammonium carbonate. When strongly heated it loses water and carbon dioxide, leaving a residue of zinc oxide. It should give no reactions with the tests for lead, copper, cadmium, arsenium, iron, aluminium, calcium, magnesium, sodium, potassium, ammonium, and only the slightest reactions for chloride or sulphate.

Zinc carbonate is a mild astringent to the skin, and is employed in dusting powders and lotions with or in place of zinc oxide.

*NOTE*.—Calamine, or native zinc carbonate, is the anhydrous normal carbonate,  $\text{ZnCO}_3$  (= 125.40).

## ZINCI CHLORIDUM.

### ZINC CHLORIDE.



Zinc chloride,  $\text{ZnCl}_2$ , may be prepared by dissolving zinc in hydrochloric acid, evaporating the resulting solution, fusing the residue, and pouring into trays or moulds to solidify. When solidified, but while still hot, it should be transferred to well-stoppered bottles which have previously been dried and warmed. If iron be present as impurity, it may be separated from the solution by adding a little chlorine water to peroxidise it, and precipitating it as ferric oxide by zinc carbonate.



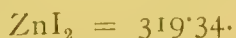
It occurs in the form of white, or almost white, porcelain-like irregular masses or pencil-shaped sticks, or as a white, granular powder, very deliquescent and caustic, odourless, and having, when tasted in dilute solution, an astringent, metallic taste. Soluble in water (10 in 4); in alcohol (1 in 1); in glycerin (about 1 in 4); also in ether. The aqueous solution is acid to litmus paper, and on evaporation is partly decomposed with formation of oxychloride. It melts at about  $250^{\circ}$ , forming a clear liquid, and boils at  $730^{\circ}$ , being partly decomposed and partly volatilised in dense, white fumes, leaving a residue of zinc oxide. In a current of chlorine, however, it sublimes unchanged, in acicular crystals. The 5 per cent aqueous solution should be clear, or at most only very slightly opalescent; and if it be mixed with an equal volume of alcohol a single drop of hydrochloric acid should suffice to render 10 mils of the mixture perfectly clear (limit of oxychloride). Its great affinity for water renders it of service in chemical operations where water is to be withdrawn during reactions. It should be free from lead, copper, cadmium, arsenium, iron, aluminium, calcium, magnesium, sodium, potassium, ammonium, and sulphates.

Zinc chloride is a powerful caustic, and is applied as a paste or by means of a pencil to malignant growths, lupus, chancres, and ulcerous sores, the paste being prepared by rubbing the zinc chloride with water or glycerin of starch; a less powerful caustic is made by adding flour, starch, or gypsum. It burns deeply and does not spread over the surrounding parts. In dilute solution, zinc chloride is used as an astringent and antiseptic. To syringe offensive ulcers and sinuses, lotions of 1 in 25 to 50 are used; for injections in gonorrhœa and for ophthalmic use lotions of 1 grain in 1 ounce are employed, sometimes with the addition of cocaine. *Liquor Zinci Chloridi* is used as a disinfectant and deodorant. The official *Liquor Zinci Chloridi* may conveniently be used in dispensing zinc chloride in lotions, etc.; 4 minims of this solution contain 3 grains of the solid salt, and it usually contains a much smaller percentage of oxychloride than the fused salt. Solutions of zinc chloride may be decanted from insoluble oxychloride, but acid must not be added to effect its solution. Zinc chloride is very poisonous; for antidotes see under *Liquor Zinci Chloridi*.

NOTES.—Solutions of zinc chloride dissolve paper and cotton, and the oxychloride dissolves wool and silk. When solutions require to be filtered, asbestos or powdered glass should be used, not paper. When zinc oxide is moistened with a strong solution of zinc chloride an oxychloride is formed, which soon sets into a hard mass; this forms the basis of some dental cements.

## ZINCI IODIDUM.

ZINC IODIDE.



Zinc iodide,  $\text{ZnI}_2$ , may be prepared by digesting 3 of zinc, granulated or in filings, with 10 of iodine in 20 of water, until the liquid

has become colourless or nearly so, when it is filtered through asbestos or powdered glass, and rapidly evaporated to dryness at a gentle heat; or by dissolving zinc oxide or carbonate in hydriodic acid, and treating the resulting solution as above. It contains 79.50 per cent. of iodine.

It occurs as a yellowish-white, granular, crystalline powder, odourless and having, when tasted in dilute solution, a sharp, saline, styptic, metallic taste, very deliquescent, and on exposure to air and light becoming brown from liberated iodine. Freely soluble in water, alcohol, or ether. The aqueous solution reddens blue litmus paper. It melts at about  $446^{\circ}$ , forming a colourless liquid, and at a higher temperature sublimes, forming quadratic needles, but partly decomposing with liberation of iodine and leaving a residue of zinc oxide. This decomposition also occurs at ordinary temperatures on long exposure to light and air. If 1 gramme be mixed with 5 mils of distilled water and a sufficiency of solution of ammonia be added to redissolve the precipitate formed, followed by a solution of 1.5 grammes of silver nitrate in 10 mils water, then, after shaking and filtering, the filtrate should not be rendered more than slightly turbid by the addition of an excess of nitric acid (limit of chloride). It should be free from lead, copper, iron, aluminium, calcium, magnesium, potassium, sodium, sulphates, and iodates, and not contain more than traces of bromine.

Zinc iodide is used in epilepsy and in syphilitic affections of the nervous system. It is best given in solution well diluted. It is used on the supposition that it will give the astringent action of the zinc with the specific action of the iodide. The iodide is present in too small an amount to exert much effect.

*Dose.*—3 to 12 centigrams ( $\frac{1}{2}$  to 2 grains).

## ZINCI OLEAS.

### ZINC OLEATE.

Zinc Sulphate	...	...	...	...	...	32.00
Hard Soap, in shavings...	...	...	...	...	...	64.00
Distilled Water, a sufficient quantity.						

Dissolve the hard soap in 480 of distilled water by the aid of heat, then dissolve the zinc sulphate in 64 of boiling distilled water, and add to the former solution; stir well, separate the oleate, wash with hot distilled water until free from sulphate, cool, dry, and powder the product.

Zinc oleate is used as a mild astringent ointment to protect the surface of the skin in excoriations, to allay irritation, to absorb discharge in eczematous conditions, and, as an absorbent dusting powder, to retain perspiration. It is often mixed with boric acid and powdered starch.

*NOTE.*—This preparation is sometimes known as Shoemaker's zinc oleate.

**ZINCI OXIDUM.**

ZINC OXIDE.

 $\text{ZnO} = 81.40.$ 

*Synonyms.*—Zinc White; Chinese White; Lana Philosophica; Flores Zinci.

Zinc oxide,  $\text{ZnO}$ , may be prepared by heating the carbonate in a loosely covered crucible to a dull-red heat until a portion taken from the centre and cooled no longer effervesces with diluted sulphuric acid. A temperature of  $280^{\circ}$  is said to be sufficient, and the product obtained at about this temperature is white, while if it has been exposed to a full red heat, the colour after cooling is yellowish. The whitest product is obtained by melting pure zinc to a bright red heat in contact with air, when the vapour ignites and burns to oxide, which is collected in suitable vessels.

It occurs as a very fine, white or yellowish-white, amorphous, impalpable, powder, odourless, tasteless, and free from gritty particles. It gradually absorbs moisture and carbon dioxide from the air, no action on test paper. Insoluble in water or alcohol, soluble in diluted acids with slight effervescence, in solution of ammonia, in solution of ammonium carbonate, and in caustic alkalies, but not in their carbonates. On heating it becomes pale yellow, and white again on cooling. It is volatile at the temperature of the electric arc. By heating with magnesium it is reduced to zinc with explosive violence; it is also reduced by heating with carbon, or in carbon monoxide. The oxide is never completely soluble in solution of ammonia, owing to imperfect combustion of the zinc from which it is prepared. Should the solution be opalescent the insoluble matter should be separated, and carefully examined for metallic fragments. If 1 gramme be treated with 10 mils of boiling water, and 1 decimil of solution of phenol-phthalein, not more than 1 mil of decinormal solution of hydrochloric acid should be required to discharge the red colour (limit of alkali). It should be free from lead, copper, cadmium, arsenium, iron, aluminium, calcium, magnesium, sodium, potassium, ammonium, carbonates, chlorides, and sulphates.

Zinc salts are given internally for their supposed action as a sedative to the central nervous system in epilepsy, chorea, hysteria, and the like; there is, however, little experimental evidence in support of their usefulness in these conditions. Zinc oxide is given to check the night-sweats of phthisis, but its action compared with that of atropine is very feeble. Externally it is used in the form of dusting powder, lotion, or ointment, as a mild astringent to the skin, as a soothing and protective application in eczema, and as a protective in slight excoriations. To check excessive perspiration, it may be mixed with boric acid or starch. Zinc oxide is best dispensed for internal use in pills, which may be massed with syrup of glucose.

*Dose.*—2 to 6 decigrams (3 to 10 grains).



**ZINCI PEROXIDUM.**

ZINC PEROXIDE.

*Synonym.*—Zinc Dioxide.

Zinc peroxide,  $\text{ZnO}_2$ , may be prepared by acting on an ammoniacal solution of zinc hydrate with solution of hydrogen peroxide, or by the action of sodium peroxide on a zinc salt, washing and drying the precipitate at  $100^\circ$ .

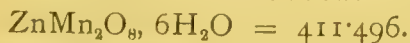
It occurs as a yellowish-white, voluminous powder, tasteless, odourless, non-hygroscopic, antiseptic, neither caustic nor irritant, and not more toxic than ordinary zinc oxide. Insoluble in water, but gives to it a slight, alkaline reaction; soluble in cold diluted acids, in diluted sulphuric acid with evolution of oxygen, and in diluted hydrochloric acid with liberation of chlorine. It gives all the reactions of peroxides, caramelises sugar, detonates on rubbing with metallic magnesium, disengages oxygen by action of acids and in contact with living tissues. It is stable in the autoclave to  $130^\circ$  and at a dry heat to  $150^\circ$ , and thus may be readily sterilised. The percentage of oxygen is variable, the variations depending on modifications in the process of making.

Zinc peroxide is used in the extemporaneous preparation of hydrogen peroxide for wounds, chronic ulcers, etc., and may be applied as a dressing mixed with tartaric acid (3 : 4); it then produces hydrogen peroxide in a nascent state *in situ*, being thus more active as a bactericidal and healing agent than the same quantity of peroxide applied in the usual way in aqueous solution. For eczema and other skin diseases it is sometimes prescribed with half its weight of potassium iodide and one-tenth its weight of tartaric acid, the mixture liberating iodine on contact with moist surfaces. It may be used as a dusting powder either alone or mixed with tannin, or in the form of gauze, or 10 per cent. ointment.

NOTES.—Zinc peroxide is also known under the trade-names Dermogen, Ektogan, and Zinc Perhydrol. The commercial article contains from 20 to 50 per cent. of the peroxide, the 20 per cent. being that recommended for therapeutic use. The content of pure zinc peroxide may be determined by adding a weighed quantity to an acidified solution of potassium iodide, and titrating the liberated iodine with standard thiosulphate solution.

**ZINCI PERMANGANAS.**

ZINC PERMANGANATE.



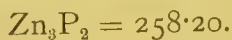
Zinc permanganate,  $\text{Zn}(\text{MnO}_4)_2, 6\text{H}_2\text{O}$ , may be prepared by adding to a concentrated solution of zinc sulphate a similar solution of barium permanganate so long as a precipitate of barium sulphate continues to fall. The precipitate is separated, the clear solution evaporated carefully at a low temperature to crystallisation, or *in vacuo* over sulphuric acid, and the crystals finally dried at about  $40^\circ$ .

It occurs in the form of dark brown, nearly black, iridescent crystals, resembling those of potassium permanganate; deliquescent. Soluble in water (1 in 3), generally leaving a slight residue. Aqueous solutions decompose in air, but will keep when corked in dark bottles. When heated slowly, it loses water of crystallisation (25·46 per cent.) and oxygen, leaving a residue of zinc manganite; on heating quickly it gives off pink vapours, or, more properly, a fine dust of manganese trioxide. Zinc permanganate gives up oxygen more easily than does the potassium salt, hence great care should be taken in bringing it in contact with easily oxidisable substances. It should be free from barium, and from more than traces of potassium chloride, or sulphate. It should be protected from the light in well-closed bottles.

Zinc permanganate resembles the potassium salt in its oxidising properties, but is more astringent. It is used chiefly in urethritis (1 grain in 8 fluid ounces), either as an injection or as a urethral douche. The incompatibles of zinc permanganate are those of potassium permanganate, but the former is even more readily reduced by contact with organic matter.

### ZINCI PHOSPHIDUM.

ZINC PHOSPHIDE.



Zinc phosphide,  $\text{Zn}_3\text{P}_2$ , may be prepared by evolving hydrogen phosphide and nitrogen from calcium phosphide and ammonium nitrite respectively, and passing the mixed gases through a porcelain tube in which zinc is heated to redness. The presence of the nitrogen is to prevent danger of explosion from oxidation; or by adding 26 of dry phosphorus, little by little, to 74 of fused zinc, direct union taking place. The pure compound contains 24·01 per cent. of phosphorus and 75·98 per cent. of zinc.

It occurs in the form of dark grey, minutely crystalline fragments of a metallic lustre, or as a steel-grey, crystalline powder, having a slight odour of phosphorus, but emitting it more strongly when triturated. The powder has the appearance of reduced iron, and a slight taste of phosphorus. Insoluble in water or alcohol, soluble in acids with evolution of hydrogen phosphide, which is not spontaneously inflammable; with nitric acid it is converted into zinc phosphate. Out of contact with air it melts at a higher temperature than zinc and sublimes unchanged, condensing in needles; but when heated in presence of air it is oxidised to zinc phosphate. On treating the phosphide with hydrochloric acid it should evolve hydrogen phosphide, which is completely absorbed by concentrated solution of copper sulphate, forming the black copper phosphide, and thus indicating the absence of metallic zinc, as the metal, under these circumstances, would evolve hydrogen, which is not absorbed by the copper solution. Zinc phosphide possesses all the properties of free phosphorus. Being very stable and not liable to oxidation by

trituration it is well adapted for administration in pill form. The pills should be prepared by trituration with milk sugar and massing with glycerin of tragacanth; acid extracts should not be used with zinc phosphide, as they may cause the evolution of phosphoretted hydrogen.

*Dose*.—3 to 15 milligrams ( $\frac{1}{20}$  to  $\frac{1}{4}$  grain).

## ZINCI STEARAS.

### ZINC STEARATE.

Zinc stearate may be prepared by mixing a boiling solution of 100 of zinc acetate with a similar solution of 279 of sodium stearate; the sodium stearate may be simply a solution of curd soap, or it may be made by adding "stearic" acid to a hot solution of sodium hydroxide. The precipitated zinc stearate is washed thoroughly with hot water, then dried, powdered, and sifted.

It occurs as a fine, white powder, tasteless, and having a feeble fatty odour. Insoluble in water, alcohol, or ether, and is neutral to litmus. On heating, it fuses, and, at a higher temperature, decomposes with evolution of inflammable vapours and the odour of burning fat, leaving a residue of zinc oxide (about 15.50 per cent.). It contains small quantities of zinc palmitate. It should be free from alkalies, alkaline earths, chlorides, etc. If 1 gramme be boiled with 50 mls of distilled water containing 2 mls of nitric acid, filtered, and washed with boiling water, the filtrate, on evaporation to dryness and ignition, should leave a residue weighing not less than 14 and not more than 16 centigrams. When zinc stearate is heated with diluted hydrochloric acid, stearic acid is liberated as an oily layer.

Zinc stearate is recommended as a soothing and mildly antiseptic preparation for acne, eczema, and other skin affections. It is used for similar purposes to zinc oleate, either alone, or combined with other powders, or in the form of Unguentum Zinci Stearas.

## ZINCI SULPHAS.

### ZINC SULPHATE.



*Synonyms*.—White Vitriol; White Copperas.

Zinc sulphate,  $\text{ZnSO}_4, 7\text{H}_2\text{O}$ , may be prepared by diluting 5 of sulphuric acid with 25 to 30 of water, adding 4 of granulated zinc, and when effervescence has nearly ceased, completing the action by the application of gentle heat. An excess of zinc should be present, so as to precipitate any lead, copper, cadmium, or arsenic which may be present. Any iron which may be present can be removed by



treatment with chlorine and zinc carbonate, as described in the case of *Zinci Chloridum*. The filtered solution is slightly acidified with diluted sulphuric acid, evaporated, and set aside to crystallise. On the large scale the salt is prepared by roasting zinc blende ( $\text{ZnS}$ ) at a low red heat, when it combines with oxygen from the air to form the sulphate, which is dissolved out by water and crystallised. Zinc sulphate contains 43·85 per cent. of water of crystallisation.

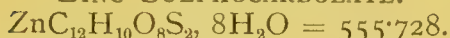
It occurs in the form of colourless, transparent, rhombic crystals, or white, acicular crystals, somewhat efflorescent, odourless and having a strong, nauseous, metallic, styptic taste. Soluble in cold water (1 in 0·7); in boiling water (1 in 0·2); insoluble in alcohol. The aqueous solution is acid to blue litmus paper. When gradually heated to  $50^{\circ}$  it loses five molecules of its water of crystallisation (31·2 per cent.) without melting; at  $100^{\circ}$  it loses another molecule, and the last molecule at about  $248^{\circ}$ , with decomposition of the salt. Zinc sulphate bears a strong resemblance to magnesium sulphate or Epsom salt, for which it is liable to be mistaken, the two salts of the same degree of water of hydration being isomorphous. The two, however, may be readily distinguished by the application of strong heat, the zinc salt decomposing and leaving a residue which is yellow when hot and white when cold, whereas the magnesium salt only loses water of crystallisation; also, the latter is neutral to litmus paper and the former acid. If 1 gramme be shaken with 10 mls of alcohol for some time, the filtrate, on the addition of an equal volume of water, should not redden blue litmus paper (absence of free acid). It should be free from lead, copper, cadmium, arsenium, aluminium, calcium, magnesium, sodium, potassium, ammonium, and acetates, and should not contain more than traces of iron or chlorides.

Zinc sulphate is sometimes given internally in such nervous disorders as chorea and epilepsy, and as an astringent in diarrhoea. It is, however, so slowly absorbed that when taken by the mouth sufficient zinc never reaches the blood to cause any action; so that by this method of administration its action is limited to the alimentary canal. Large doses act as reflex emetics, owing to their irritating effect on the stomach. It is especially useful in narcotic poisoning, but must not be given for its emetic action in the presence of much chloride, or caustic zinc chloride will be formed and perforation may ensue. Zinc sulphate is used as an astringent, to lessen secretion from mucous surfaces, in leucorrhœa and the subacute stages of gonorrhœa (2 to 3 grains to 1 ounce); for ophthalmic use 1 grain to 1 ounce is used. Zinc sulphate points are prepared for intra-uterine use. The salt is incompatible with alkali carbonates, lime water, and astringent infusions and decoctions. In cases of poisoning by zinc salts, alkali carbonates should be given freely, with milk and white of egg, pain being allayed by the administration of opium.

*Dose*.—As astringent,  $\frac{1}{2}$  to 2 decigrams (1 to 3 grains); as emetic, 6 to 20 decigrams (10 to 30 grains).

**ZINCI SULPHOCARBOLAS.**

ZINC SULPHOCARBOLATE.



*Synonyms.*—Zinci Phenolsulphonas; Zinc Phenol-parasulphonate;  
Zinc Phenolsulphonate.

Zinc sulphocarbolate,  $\text{Zn}(\text{OHC}_6\text{H}_4\text{OS}_3)_2, 8\text{H}_2\text{O}$ , may be prepared by first preparing the barium salt as described in the case of Sodii Sulphocarbolas, and decomposing a solution of it by the exact equivalent of zinc sulphate, whereby barium sulphate is precipitated, while zinc sulphocarbolate remains in solution and is obtained by evaporation and crystallisation.

It occurs in the form of colourless, transparent, rhombic prisms or tabular crystals, which may become slightly pink on exposure to light and air; efflorescent, odourless, but sometimes having a faint phenol odour. Soluble in cold water (1 in 2); in boiling water (3 in 1); in cold alcohol (1 in  $2\frac{1}{2}$ ); in boiling alcohol (1 in 0·56). The aqueous solution reddens blue litmus paper. On heating to  $100^\circ$  it loses six molecules of water of crystallisation, the remainder at  $125^\circ$ . At higher temperatures it chars, emitting inflammable vapours having an odour of phenol, and finally leaving a residue amounting to about 14·6 per cent. of the original weight. It should be free from lead, copper, cadmium, arsenium, iron, aluminium, calcium, barium, magnesium, sodium, potassium, ammonium, acetates, and chlorides, and should not contain more than traces of sulphate.

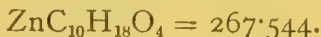
Zinc sulphocarbolate is rarely given internally. It is used as an astringent and antiseptic injection in leucorrhœa and gonorrhœa (3 grains to 1 ounce), and as a spray for the throat and nose (5 grains to 1 ounce). It has the same action as zinc sulphate, but is somewhat more antiseptic.

*Dose.*—6 to 25 centigrams (1 to 4 grains).

*NOTES.*—Zinc sulphanilate is employed similarly to the sulphocarbolate, which it closely resembles. It is stated to be suitable for use in dilute solution (1 to 2 grains to 1 ounce) in the acute stage of gonorrhœa. Zinc sulphanilate is also known under the trade-name Nizin.

**ZINCI VALERIANAS.**

ZINC VALERIANATE.



*Synonyms.*—Zinc Isovalerianate; Zinc Valerate.

Zinc valerianate,  $\text{Zn}(\text{C}_5\text{H}_9\text{O}_2)_2$ , may be prepared by mixing hot solutions (not above  $70^\circ$ ) of sodium valerianate and zinc sulphate, the zinc valerianate being precipitated; or a mixture of the saturated solutions of the two salts may be evaporated cautiously to dryness below  $70^\circ$ , and the saline residue extracted with alcohol, in which the sodium sulphate is insoluble; or by saturating isovalerianic acid with zinc carbonate; the product is drained and dried on filtering paper at ordinary temperatures.

It occurs in the form of white, lustrous, pearly scales, or as a white

powder, having the odour of valerianic acid and a sweet, astringent and metallic taste. It is anhydrous, or contains one or two molecules of water of crystallisation, according to the method of preparation. Soluble in water (1 in 120); in alcohol (1 in 60); in ether (1 in 500). The aqueous solution is slightly acid to blue litmus paper, and when boiled becomes turbid from loss of valerianic acid and formation of a basic salt. On exposure to air the salt slowly loses valerianic acid. When heated it melts, and at a higher temperature decomposes, giving off inflammable vapours and finally leaving a residue of zinc oxide which should weigh not less than 26 nor more than 30·4 per cent. The anhydrous salt gives 30·42 per cent., the salt with one molecule of water of crystallisation, 28·51 per cent., with two molecules of water of crystallisation, 26·81 per cent. of zinc oxide. When heated with diluted sulphuric acid it gives a distillate, which when mixed with a solution of copper acetate does not immediately affect the transparency of the liquid, but forms after a little time oily drops, which gradually pass into a bluish-white, crystalline deposit (absence of butyrate). Butyric acid, if present, forms an immediate crystalline precipitate. If 5 decigrams be triturated with 3 mls of water and 2 decimils of ferric chloride solution added, the filtrate should not show a red colour (absence of acetates). It should be free from lead, copper, cadmium, arsenium, iron, aluminium, calcium, magnesium, sodium, potassium, ammonium, acetate, or carbonate, and from more than traces of chloride or sulphate.

Zinc valerianate is employed on the supposition that it combines the action of zinc with that of valerian. Valerian has no action on the nervous system, and its value in hysteria depends upon its nauseating taste and smell. The zinc ion is not absorbed. It is given in pill form often with the valerianates of iron and quinine, or with compound asafetida pill. Pills of zinc valerianate are best prepared with glycerin of tragacanth.

*Dose.*— $\frac{1}{2}$  to 2 decigrams (1 to 3 grains).

## ZINCUM.

### ZINC.

$$\text{Zn} = 65\cdot40.$$

Zinc is a metallic element which is found in the form of oxide, carbonate, sulphide, and silicate, in different parts of the world.

It is a bluish-white metal, showing a crystalline fracture, and occurs in the form of thin sheets, granules, moulded rods, and fine powder, the sheets and granules being chiefly used. The metal should be entirely soluble in diluted hydrochloric or sulphuric acid, hydrogen being evolved, and the solution should yield no characteristic reaction with the tests for arsenium, cadmium, copper, iron, lead, and tin.

Zinc is used for the generation of hydrogen in tests for antimony and arsenium.



**ZINGIBER.****GINGER.**

Ginger consists of the rhizome of *Zingiber officinale*, Roscoe (N.O. Scitamineæ), freed from the epidermis and dried. Ginger is indigenous to Asia, but is cultivated in the West Indies, Africa, Java, and other tropical countries. The plant produces a branching rhizome, which is dug up after the aerial parts have died down, washed and peeled with a narrow-bladed knife; they are then again washed and dried in the sun. This procedure is followed in Jamaica, and yields the drug known as "scraped unbleached ginger," which is alone official.

It occurs in flattened branched rhizomes known as "races" or "hands," not often exceeding 10 centimetres in length. The branches ("fingers") arise from the upper surface of the rhizome, widen, contract, and terminate in the remains of a stem or bud; they average about 2 centimetres in length. The surface is pale buff, striated, and somewhat fibrous from the leaf-traces exposed by the scraping. The rhizome breaks easily, exhibiting a starchy or sometimes resinous fracture. The smoothed section exhibits under the lens numerous yellow oil cells and a thin yellow line separating the cortex from the stele. The odour of the drug is agreeable and aromatic, the taste strongly pungent.

The drug contains an abundance of starch, the grains of which are simple, sack-shaped, oval or trapezoidal,  $12\mu$  to  $30\mu$  in length, with distinct striations and very eccentric hilum. It yields from 3 to 5 per cent. of total ash, from 3 to 6 per cent. of resinous extract to 90 per cent. alcohol, and about 10 per cent. of aqueous extract. Powdered ginger may be identified by the characteristic starch grains, by the abundance of thin-walled parenchymatous tissue, and by the moderately thick-walled fibres accompanying the bundles, in which narrow brown secretion cells may be found.

The drug contains from 1 to 3 per cent. of volatile oil (specific gravity, 0.875 to 0.885; optical rotation,  $-25^{\circ}$  to  $-45^{\circ}$ ; boiling temperature,  $155^{\circ}$  to  $300^{\circ}$ ), in which camphene, phellandrene, zingiberene, cineol, citral, and borneol have been detected, and to which it owes its aroma. The pungency is due to gingerol, a phenolic body, which has been obtained as a yellowish viscid oil of doubtful purity, and rapidly loses its pungency when warmed with solution of sodium hydroxide. Ginger essences or extracts are sometimes "fortified" by the addition of capsicum, the presence of which may be detected by the following test:—Digest 10 mls of the suspected liquid on a water-bath with a small quantity of caustic alkali for fifteen minutes; then drive off the alcohol by evaporation, make the residue faintly acid with hydrochloric acid, and shake it in a test tube with 5 mls of ether, with which the evaporating dish has previously been rinsed. On tasting the ethereal liquid it will be found to be devoid of pungency if capsicum has not been used, but the pungent, bitter taste of capsicum will be very marked if capsicum has been added to the essence or extract.

Ginger is used as a carminative and aromatic stimulant to the gastro-intestinal tract. It is given for flatulence, atonic dyspepsia, and to correct the griping tendency of purgative medicines, and tincture of ginger is added to mixtures, usually with sodium bicarbonate, for its gastric effect; syrup of ginger is used as a flavouring and carminative agent with saline and other purgatives. For use in pills *Oleoresina Zingiberis* is suitable.

*Dose*.—3 to 10 decigrams (5 to 15 grains).

NOTES.—Numerous varieties of ginger occur in commerce. *Jamacia* ginger, which has the finest aroma, is usually scraped, and is sometimes limed to whiten it; it may be recognised by the size of the hands and length of the fingers. *Cochin* ginger is in smaller hands, and the branches are usually shorter and thicker; it is often imported only partially scraped ("unscraped" or "coated"), and may be bleached (limed) or unbleached. *African* ginger is more pungent (alcoholic extract about 10 per cent.), but less aromatic; it is usually small, dark, and coated, but may also be found limed. *Japanese* ginger is commonly in small flattened pieces; many of the starch grains are compound, and the oil differs in its physical character (specific gravity. 0.894, optical rotation  $+9^{\circ}40'$ ), these particulars indicating that it is not produced by *Zingiber officinale*. Ground ginger is often adulterated with exhausted ("spent") ginger, a sophistication that may be detected by a diminution in the ash soluble in water, which should not fall below 1.5 per cent., as well as by the yield of alcoholic and aqueous extract.

## ZIZYPHUS.

JUJUBE BERRIES.

*Synonym*.—*Jujuba*.

Jujube berries are the fruits of *Zizyphus sativa*, Gaertn., or *Z. Lotus*, Lam. (N.O. Rhamnææ), shrubs or small trees which are cultivated in Spain, Italy, the South of France, and Tunis.

The fruits are roundish-ovate or oblong drupes about the size of large olives, and have a thin, coriaceous, bright red skin, which becomes reddish-brown and wrinkled when dried. It encloses a sweet acidulous pulp, in which is embedded an ovate or oblong pointed stone.

Sugar and mucilage are the chief constituents of the berries, but traces of ziziphic acid are also present, and tannin has been found in the bark of the tree.

Jujube berries are demulcent and nutritive, and have been used in the form of decoction for throat and bronchial irritation. Jujube paste (*Massa de Jujubis* or *Pâte de Jujube*) is prepared by infusing 5 of the fruit in 35 of distilled water, straining without pressure, dissolving 30 of washed gum acacia and 20 of refined sugar in the infusion, by heating slowly on a water-bath for twelve hours, removing the scum, cautiously adding 2 of undiluted orange-flower water, running the mixture into oiled flat moulds, and drying in a stove at  $40^{\circ}$ .

## INTERNATIONAL ATOMIC WEIGHTS (1907).

O = 16.00

Aluminium .....	Al	27.1	Neodymium .....	Nd	143.6
Antimony .....	Sb	120.2	Neon .....	Ne	20
Argon .....	A	39.9	Nickel .....	Ni	58.7
Arsenic .....	As	75.0	Nitrogen .....	N	14.01
Barium .....	Ba	137.4	Osmium.....	Os	191
Bismuth .....	Bi	208.0	Oxygen .....	O	16.00
Boron.....	B	11.0	Palladium .....	Pd	106.5
Bromine .....	Br	79.96	Phosphorus .....	P	31.0
Cadmium .....	Cd	112.4	Platinum .....	Pt	194.8
Cæsium .....	Cs	132.9	Potassium .....	K	39.15
Calcium.....	Ca	40.1	Praseodymium ...	Pr	140.5
Carbon .....	C	12.00	Radium .....	Rd	225
Cerium .....	Ce	140.25	Rhodium .....	Rh	103.0
Chlorine.....	Cl	35.45	Rubidium .....	Rb	85.5
Chromium.....	Cr	52.1	Ruthenium .....	Ru	101.7
Cobalt .....	Co	59.0	Samarium .....	Sa	150.3
Columbium .....	Cb	94	Scandium .....	Sc	44.1
Copper .....	Cu	63.6	Selenium .....	Se	79.2
Erbium .....	Er	166	Silicon .....	Si	28.4
Europium .....	Eu	152	Silver .....	Ag	107.93
Fluorine.....	F	19.0	Sodium .....	Na	23.05
Gadolinium .....	Gd	156	Strontium .....	Sr	87.6
Gallium .....	Ga	70	Sulphur .....	S	32.06
Germanium .....	Ge	72.5	Tantalum .....	Ta	181
Glucinum .....	Gl	9.1	Tellurium .....	Te	127.6
Gold .....	Au	197.2	Terbium .....	Tb	159.2
Helium .....	He	4.0	Thallium .....	Tl	204.1
Hydrogen .....	H	1.008	Thorium .....	Th	232.5
Indium .....	In	115	Thulium.....	Tm	171
Iodine .....	I	126.97	Tin.....	Sn	119.0
Iridium .....	Ir	193.0	Titanium .....	Ti	48.1
Iron .....	Fe	55.9	Tungsten .....	W	184
Krypton.....	Kr	81.8	Uranium .....	U	238.5
Lanthanum .....	La	138.9	Vanadium .....	V	51.2
Lead .....	Pb	206.9	Xenon .....	Xe	128
Lithium.....	Li	7.03	Ytterbium .....	Yb	173.0
Magnesium .....	Mg	24.36	Yttrium .....	Yt	89.0
Manganese .....	Mn	55.0	Zinc .....	Zn	65.4
Mercury.....	Hg	200.0	Zirconium.....	Zr	90.6
Molybdenum.....	Mo	96.0			



## METRIC WEIGHTS AND MEASURES.

## MEASURES OF LENGTH.

1 Micromillimetre ( $\mu\mu$ )	=	0'000001 Mm.	=	0'00000004 Inch.
1 Micron ( $\mu$ )	=	0'001 Mm.	=	0'0000394 Inch.
1 Millimetre (Mm.)	=	0'001 M.	=	0'0393701 Inch.
1 Centimetre (Cm.)	=	0'010 M.	=	0'3937011 Inch.
1 Decimetre (Dm.)	=	0'100 M.	=	3'9370113 Inches.
1 Metre (M.)	=	1'0 M.	=	$\left\{ \begin{array}{l} 39'370113 \text{ Inches.} \\ 3'280843 \text{ Feet.} \\ 1'0936143 \text{ Yards.} \end{array} \right.$
1 Dekametre (Dkm.)	=	10'0 M.	=	10'93614 Yards.
1 Hectometre (Hm.)	=	100'0 M.	=	109'36143 Yards.
1 Kilometre (Km.)	=	1000'0 M.	=	0'62137 Mile.
1 Myriametre (Mym.)	=	10,000'0 M.	=	6'21371 Miles.

## WEIGHTS OR MEASURES OF MASS.

1 Microgram ( $\gamma$ )	=	0'001 Mgm.	=	0'000015 Grain.
1 Milligram (Mgm.)	=	0'001 Gm.	=	0'015 Grain.
1 Centigram (Cgm.)	=	0'010 Gm.	=	0'154 Grain.
1 Decigram (Dgm.)	=	0'100 Gm.	=	1'543 Grains.
			=	$\left\{ \begin{array}{l} 15'4324 \text{ Grains.} \\ 0'7716 \text{ Scruple.} \end{array} \right.$
1 Gramme (Gm.)	=	1'0 Gm.	=	$\left\{ \begin{array}{l} 0'2572 \text{ Drachm.} \\ 0'03215 \text{ Ounce (Troy).} \\ 0'03527 \text{ Ounce (Avoir.).} \end{array} \right.$
1 Dekagram (Dkgm.)	=	10'0 Gm.	=	0'3527 Ounce (Avoir.).
1 Hectogram (Hgm.)	=	100'0 Gm.	=	3'5274 Ounce (Avoir.).
1 Kilogram (Kilo.)	=	1000'0 Gm.	=	2'2046 Pounds.
1 Myriagram (Mygm.)	=	10'0 Kilo.	=	22'0462 Pounds.
1 Quintal (Q.)	=	100'0 Kilo.	=	1'9684 Hundredweight.
1 Millier or Tonne (T.)	=	1000'0 Kilo.	=	0'9842 Ton.

## MEASURES OF CAPACITY.

1 Microlitre ( $\lambda$ )	=	0'001 Ml.	=	0'0169 Minim.
1 Centimil (C.)	=	0'010 Ml.	=	0'1689 Minim.
1 Decimil (D.)	=	0'100 Ml.	=	1'6894 Minims.
1 Mil or Millilitre (Ml.)	=	0'001 L.	=	0'0352 Fluid Ounce.
1 Centilitre (Cl.)	=	0'010 L.	=	0'0176 Pint.
1 Decilitre (Dl.)	=	0'100 L.	=	0'1759 Pint.
1 Litre (L.)	=	1'0 L.	=	$\left\{ \begin{array}{l} 35'1960 \text{ Fluid Ounces.} \\ 1'7598 \text{ Pints.} \\ 0'219 \text{ Gallon.} \end{array} \right.$
1 Dekalitre (Dkl.)	=	10'0 L.	=	2'19975 Gallons.
1 Hectolitre (Hl.)	=	100'0 L.	=	2'74969 Bushels.
1 Kilolitre (Kl.)	=	1000'0 L.	=	3'43712 Quarters.

## IMPERIAL WEIGHTS AND MEASURES.

## MEASURES OF LENGTH.

1 Inch ... ..	=	25·3999 Millimetres.
1 Foot (12 inches) ... ..	=	{ 304·7997 Millimetres. 0·3047997 Metre.
1 Yard (3 feet) ... ..	=	{ 914·3992 Millimetres. 0·9143992 Metre.
1 Mile (1760 yards) ... ..	=	{ 1,609,342·5920 Millimetres. 1·6093426 Kilometres.

## WEIGHTS OR MEASURES OF MASS.

1 Grain ... ..	=	{ 0·0648 Gramme. 64·7989 Milligrams.
1 Scruple (20 grains) ... ..	=	1·2959 Grammes.
1 Drachm (3 scruples or 60 grains) ... ..	=	3·8879 Grammes.
1 Troy or Apothecaries' Ounce (8 drachms or 480 grains) ... ..	=	31·1035 Grammes.
1 Avoirdupois Ounce (437·5 grains) ... ..	=	28·3495 Grammes.
1 Pound (7000 grains) ... ..	=	{ 453·5924 Grammes. 0·4536 Kilogram.
1 Stone (14 pounds) ... ..	=	6·350 Kilograms.
1 Hundredweight (112 pounds) ... ..	=	50·80 Kilograms.
1 Ton (2240 pounds) ... ..	=	1016·00 Kilograms.

## MEASURES OF CAPACITY.

1 Minim (0·9114583 grain of water) ... ..	=	0·0592 Mil.
1 Fluid Drachm (60 minims or 54·6875 grains) ... ..	=	3·5515 Mils.
1 Fluid Ounce (8 fluid drachms or 437·5 grains) ... ..	=	{ 28·4123 Mils. 0·0284 Litre.
1 Pint (20 fluid ounces or 8750 grains) ... ..	=	{ 568·2454 Mils. 0·5682 Litre.
1 Quart (40 fluid ounces or 17,500 grains) ... ..	=	{ 1136·4908 Mils. 1·1364 Litres.
1 Gallon (8 pints or 70,000 grains) ... ..	=	{ 4545·9631 Mils. 4·5459631 Litres.

## PERCENTAGE EQUIVALENTS.

The figures in the first three columns show the exact weight of a substance contained in a pint, pound, or ounce of a preparation made up to 100 parts by weight or volume; the figures in the last three columns similarly show the exact quantity of a liquid ingredient present in a pint, pound, or ounce of a preparation made up to 100 parts. In the case of liquid preparations which are lighter or heavier than water, it must be understood that "pound" represents four-fifths of a pint, *i.e.*, the volume of a pound of distilled water.

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
$\frac{7}{800}$	$\frac{7}{1000}$	$\frac{7}{16000}$	0.0001	$\frac{6}{625}$	$\frac{24}{3125}$	$\frac{3}{6250}$
$\frac{7}{400}$	$\frac{7}{500}$	$\frac{7}{8000}$	0.0002	$\frac{12}{625}$	$\frac{48}{3125}$	$\frac{3}{3125}$
$\frac{21}{800}$	$\frac{21}{1000}$	$\frac{21}{16000}$	0.0003	$\frac{18}{625}$	$\frac{72}{3125}$	$\frac{9}{6250}$
$\frac{7}{200}$	$\frac{7}{250}$	$\frac{7}{4000}$	0.0004	$\frac{24}{625}$	$\frac{96}{3125}$	$\frac{6}{3125}$
$\frac{7}{160}$	$\frac{7}{200}$	$\frac{7}{3200}$	0.0005	$\frac{6}{125}$	$\frac{24}{625}$	$\frac{3}{1250}$
$\frac{21}{400}$	$\frac{21}{500}$	$\frac{21}{8000}$	0.0006	$\frac{36}{625}$	$\frac{144}{3125}$	$\frac{9}{3125}$
$\frac{49}{800}$	$\frac{49}{1000}$	$\frac{49}{16000}$	0.0007	$\frac{42}{625}$	$\frac{168}{3125}$	$\frac{21}{6250}$
$\frac{7}{100}$	$\frac{7}{125}$	$\frac{7}{2000}$	0.0008	$\frac{48}{625}$	$\frac{192}{3125}$	$\frac{12}{3125}$
$\frac{63}{800}$	$\frac{63}{1000}$	$\frac{63}{16000}$	0.0009	$\frac{54}{625}$	$\frac{216}{3125}$	$\frac{27}{6250}$
$\frac{7}{80}$	$\frac{7}{100}$	$\frac{7}{1600}$	0.001	$\frac{12}{125}$	$\frac{48}{625}$	$\frac{3}{625}$
$\frac{21}{160}$	$\frac{21}{200}$	$\frac{21}{3200}$	0.0015	$\frac{18}{125}$	$\frac{72}{625}$	$\frac{9}{1250}$
$\frac{7}{40}$	$\frac{7}{50}$	$\frac{7}{800}$	0.002	$\frac{24}{125}$	$\frac{96}{625}$	$\frac{6}{625}$
$\frac{7}{32}$	$\frac{7}{40}$	$\frac{7}{640}$	0.0025	$\frac{6}{25}$	$\frac{24}{125}$	$\frac{3}{250}$
$\frac{21}{80}$	$\frac{21}{100}$	$\frac{21}{1600}$	0.003	$\frac{36}{125}$	$\frac{144}{625}$	$\frac{9}{625}$
$\frac{49}{160}$	$\frac{49}{200}$	$\frac{49}{3200}$	0.0035	$\frac{42}{125}$	$\frac{168}{625}$	$\frac{21}{1250}$
$\frac{7}{20}$	$\frac{7}{25}$	$\frac{7}{400}$	0.004	$\frac{48}{125}$	$\frac{192}{625}$	$\frac{12}{625}$
$\frac{63}{160}$	$\frac{63}{200}$	$\frac{63}{3200}$	0.0045	$\frac{54}{125}$	$\frac{216}{625}$	$\frac{27}{1250}$
$\frac{7}{16}$	$\frac{7}{20}$	$\frac{7}{320}$	0.005	$\frac{12}{25}$	$\frac{48}{125}$	$\frac{3}{125}$
$\frac{77}{160}$	$\frac{77}{200}$	$\frac{77}{3200}$	0.0055	$\frac{25}{125}$	$\frac{100}{625}$	$\frac{1}{625}$
$\frac{21}{40}$	$\frac{21}{50}$	$\frac{21}{800}$	0.006	$\frac{36}{125}$	$\frac{144}{625}$	$\frac{9}{625}$
$\frac{91}{160}$	$\frac{91}{200}$	$\frac{91}{3200}$	0.0065	$\frac{78}{125}$	$\frac{312}{625}$	$\frac{39}{1250}$
$\frac{80}{160}$	$\frac{80}{200}$	$\frac{80}{3200}$	0.007	$\frac{84}{125}$	$\frac{336}{625}$	$\frac{21}{625}$
$\frac{21}{32}$	$\frac{21}{40}$	$\frac{21}{640}$	0.0075	$\frac{18}{25}$	$\frac{72}{125}$	$\frac{9}{250}$
$\frac{7}{10}$	$\frac{7}{14}$	$\frac{7}{200}$	0.008	$\frac{25}{100}$	$\frac{100}{400}$	$\frac{1}{400}$
$\frac{119}{160}$	$\frac{119}{200}$	$\frac{119}{3200}$	0.0085	$\frac{102}{125}$	$\frac{408}{625}$	$\frac{51}{1250}$
$\frac{63}{80}$	$\frac{63}{100}$	$\frac{63}{1600}$	0.009	$\frac{108}{125}$	$\frac{432}{625}$	$\frac{27}{625}$
$\frac{133}{160}$	$\frac{133}{200}$	$\frac{133}{3200}$	0.0095	$\frac{114}{125}$	$\frac{456}{625}$	$\frac{75}{1250}$
$\frac{7}{8}$	$\frac{7}{10}$	$\frac{7}{160}$	0.01	$\frac{24}{25}$	$\frac{96}{100}$	$\frac{6}{125}$
$\frac{132}{160}$	$\frac{132}{200}$	$\frac{132}{3200}$	0.0125	$\frac{15}{100}$	$\frac{60}{400}$	$\frac{3}{400}$
$\frac{136}{160}$	$\frac{136}{200}$	$\frac{136}{3200}$	0.015	$\frac{15}{100}$	$\frac{60}{400}$	$\frac{3}{400}$
$\frac{117}{160}$	$\frac{117}{200}$	$\frac{117}{3200}$	0.0175	$\frac{15}{100}$	$\frac{60}{400}$	$\frac{3}{400}$
$\frac{134}{160}$	$\frac{134}{200}$	$\frac{134}{3200}$	0.02	$\frac{15}{100}$	$\frac{60}{400}$	$\frac{3}{400}$
$\frac{131}{160}$	$\frac{131}{200}$	$\frac{131}{3200}$	0.0225	$\frac{15}{100}$	$\frac{60}{400}$	$\frac{3}{400}$
$\frac{216}{160}$	$\frac{216}{200}$	$\frac{216}{3200}$	0.025	$\frac{15}{100}$	$\frac{60}{400}$	$\frac{3}{400}$
$\frac{213}{160}$	$\frac{213}{200}$	$\frac{213}{3200}$	0.0275	$\frac{15}{100}$	$\frac{60}{400}$	$\frac{3}{400}$



Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
2 $\frac{5}{8}$	2 $\frac{1}{10}$	2 $\frac{1}{10}$	0·03	2 $\frac{2}{5}$	2 $\frac{38}{125}$	1 $\frac{8}{125}$
2 $\frac{27}{32}$	2 $\frac{11}{40}$	2 $\frac{11}{40}$	0·0325	3 $\frac{3}{5}$	2 $\frac{62}{125}$	1 $\frac{39}{250}$
3 $\frac{1}{16}$	2 $\frac{9}{20}$	2 $\frac{9}{20}$	0·035	3 $\frac{9}{5}$	2 $\frac{86}{125}$	1 $\frac{21}{125}$
3 $\frac{1}{8}$	2 $\frac{8}{10}$	2 $\frac{8}{10}$	0·0375	3 $\frac{3}{5}$	2 $\frac{22}{25}$	1 $\frac{9}{50}$
3 $\frac{1}{4}$	2 $\frac{4}{5}$	2 $\frac{4}{5}$	0·04	3 $\frac{21}{5}$	3 $\frac{9}{125}$	1 $\frac{24}{125}$
3 $\frac{3}{8}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$	0·0425	4 $\frac{2}{5}$	3 $\frac{33}{125}$	1 $\frac{51}{250}$
3 $\frac{1}{2}$	3 $\frac{3}{10}$	3 $\frac{3}{10}$	0·045	4 $\frac{8}{5}$	3 $\frac{57}{125}$	1 $\frac{27}{125}$
4 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	0·0475	4 $\frac{14}{5}$	3 $\frac{81}{125}$	1 $\frac{57}{250}$
4 $\frac{1}{8}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	0·05	4 $\frac{4}{5}$	3 $\frac{21}{25}$	1 $\frac{6}{25}$
4 $\frac{1}{4}$	3 $\frac{2}{5}$	3 $\frac{2}{5}$	0·0525	5 $\frac{1}{5}$	4 $\frac{4}{25}$	1 $\frac{63}{250}$
4 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	0·055	5 $\frac{2}{5}$	4 $\frac{28}{125}$	1 $\frac{33}{125}$
5 $\frac{1}{2}$	4 $\frac{1}{4}$	4 $\frac{1}{4}$	0·0575	5 $\frac{2}{5}$	4 $\frac{52}{125}$	1 $\frac{69}{250}$
5 $\frac{1}{4}$	4 $\frac{1}{5}$	4 $\frac{1}{5}$	0·06	5 $\frac{1}{5}$	4 $\frac{76}{125}$	1 $\frac{36}{125}$
5 $\frac{1}{8}$	4 $\frac{3}{8}$	4 $\frac{3}{8}$	0·0625	6	4 $\frac{4}{25}$	1 $\frac{3}{25}$
5 $\frac{1}{4}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	0·065	6 $\frac{1}{5}$	4 $\frac{125}{125}$	1 $\frac{39}{250}$
5 $\frac{1}{2}$	4 $\frac{2}{5}$	4 $\frac{2}{5}$	0·0675	6 $\frac{2}{5}$	5 $\frac{23}{125}$	1 $\frac{81}{250}$
6 $\frac{1}{8}$	4 $\frac{1}{10}$	4 $\frac{1}{10}$	0·07	6 $\frac{18}{5}$	5 $\frac{47}{125}$	1 $\frac{42}{125}$
6 $\frac{1}{4}$	5 $\frac{1}{10}$	5 $\frac{1}{10}$	0·0725	6 $\frac{24}{5}$	5 $\frac{71}{125}$	1 $\frac{87}{250}$
6 $\frac{1}{2}$	5 $\frac{1}{5}$	5 $\frac{1}{5}$	0·075	7 $\frac{1}{5}$	5 $\frac{19}{25}$	1 $\frac{9}{25}$
6 $\frac{3}{8}$	5 $\frac{1}{4}$	5 $\frac{1}{4}$	0·0775	7 $\frac{2}{5}$	5 $\frac{119}{125}$	1 $\frac{93}{250}$
7	5 $\frac{3}{10}$	5 $\frac{3}{10}$	0·08	7 $\frac{17}{5}$	6 $\frac{18}{125}$	1 $\frac{48}{125}$
7 $\frac{1}{8}$	5 $\frac{1}{4}$	5 $\frac{1}{4}$	0·0825	7 $\frac{23}{5}$	6 $\frac{42}{125}$	1 $\frac{99}{250}$
7 $\frac{1}{4}$	5 $\frac{1}{5}$	5 $\frac{1}{5}$	0·085	8 $\frac{4}{5}$	6 $\frac{66}{125}$	1 $\frac{51}{125}$
7 $\frac{1}{2}$	6 $\frac{1}{8}$	6 $\frac{1}{8}$	0·0875	8 $\frac{6}{5}$	6 $\frac{18}{25}$	1 $\frac{3}{25}$
7 $\frac{3}{8}$	6 $\frac{3}{10}$	6 $\frac{3}{10}$	0·09	8 $\frac{16}{5}$	6 $\frac{114}{125}$	1 $\frac{34}{125}$
8 $\frac{1}{8}$	6 $\frac{1}{4}$	6 $\frac{1}{4}$	0·0925	8 $\frac{22}{5}$	7 $\frac{13}{125}$	1 $\frac{111}{250}$
8 $\frac{1}{4}$	6 $\frac{1}{5}$	6 $\frac{1}{5}$	0·095	9 $\frac{3}{5}$	7 $\frac{37}{125}$	1 $\frac{57}{250}$
8 $\frac{1}{2}$	6 $\frac{2}{5}$	6 $\frac{2}{5}$	0·0975	9 $\frac{8}{5}$	7 $\frac{61}{125}$	1 $\frac{117}{250}$
8 $\frac{3}{4}$	7	7	0·1	9 $\frac{1}{5}$	7 $\frac{17}{25}$	1 $\frac{12}{25}$
9 $\frac{1}{16}$	7 $\frac{7}{10}$	7 $\frac{7}{10}$	0·105	10 $\frac{2}{5}$	8 $\frac{8}{125}$	1 $\frac{63}{125}$
9 $\frac{1}{8}$	7 $\frac{1}{5}$	7 $\frac{1}{5}$	0·11	10 $\frac{14}{5}$	8 $\frac{56}{125}$	1 $\frac{66}{125}$
10 $\frac{1}{16}$	8 $\frac{1}{10}$	8 $\frac{1}{10}$	0·115	11 $\frac{1}{5}$	8 $\frac{104}{125}$	1 $\frac{69}{125}$
10 $\frac{1}{8}$	8 $\frac{1}{5}$	8 $\frac{1}{5}$	0·12	11 $\frac{2}{5}$	9 $\frac{27}{125}$	1 $\frac{72}{125}$
10 $\frac{1}{4}$	8 $\frac{3}{10}$	8 $\frac{3}{10}$	0·125	12	9 $\frac{1}{5}$	1 $\frac{3}{5}$
11 $\frac{1}{8}$	9 $\frac{1}{10}$	9 $\frac{1}{10}$	0·13	12 $\frac{1}{5}$	9 $\frac{23}{125}$	1 $\frac{78}{125}$
11 $\frac{1}{4}$	9 $\frac{2}{5}$	9 $\frac{2}{5}$	0·135	12 $\frac{24}{5}$	10 $\frac{46}{125}$	1 $\frac{81}{125}$
11 $\frac{3}{8}$	9 $\frac{3}{10}$	9 $\frac{3}{10}$	0·14	13	10 $\frac{94}{125}$	1 $\frac{84}{125}$
11 $\frac{1}{2}$	10 $\frac{1}{5}$	10 $\frac{1}{5}$	0·145	13 $\frac{1}{5}$	11 $\frac{17}{125}$	1 $\frac{87}{125}$
11 $\frac{3}{4}$	10 $\frac{2}{5}$	10 $\frac{2}{5}$	0·15	14	11 $\frac{2}{5}$	1 $\frac{18}{25}$
12 $\frac{1}{8}$	10 $\frac{1}{4}$	10 $\frac{1}{4}$	0·155	14 $\frac{1}{5}$	11 $\frac{13}{125}$	1 $\frac{93}{250}$
12 $\frac{1}{4}$	11 $\frac{1}{5}$	11 $\frac{1}{5}$	0·16	15	12 $\frac{36}{125}$	1 $\frac{96}{125}$
12 $\frac{1}{2}$	11 $\frac{2}{5}$	11 $\frac{2}{5}$	0·165	15 $\frac{1}{5}$	12 $\frac{84}{125}$	1 $\frac{99}{125}$
13 $\frac{1}{8}$	11 $\frac{3}{10}$	11 $\frac{3}{10}$	0·17	16 $\frac{2}{5}$	13 $\frac{7}{125}$	1 $\frac{102}{125}$
13 $\frac{1}{4}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$				1 $\frac{125}{125}$

## Percentage Equivalents—continued.

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
15 $\frac{5}{16}$	12 $\frac{1}{4}$	4 $\frac{9}{64}$	0·175	16 $\frac{4}{5}$	13 $\frac{11}{25}$	21 $\frac{2}{5}$
15 $\frac{3}{4}$	12 $\frac{3}{5}$	6 $\frac{3}{80}$	0·18	17 $\frac{7}{25}$	13 $\frac{103}{125}$	108 $\frac{1}{125}$
16 $\frac{3}{16}$	12 $\frac{19}{20}$	25 $\frac{9}{320}$	0·185	17 $\frac{19}{25}$	14 $\frac{26}{125}$	111 $\frac{1}{125}$
16 $\frac{5}{8}$	13 $\frac{3}{10}$	13 $\frac{3}{160}$	0·19	18 $\frac{6}{25}$	14 $\frac{74}{125}$	114 $\frac{1}{125}$
17 $\frac{1}{16}$	13 $\frac{13}{20}$	27 $\frac{3}{320}$	0·195	18 $\frac{18}{25}$	14 $\frac{122}{125}$	117 $\frac{1}{125}$
17 $\frac{1}{2}$	14	7 $\frac{7}{8}$	0·2	19 $\frac{1}{5}$	15 $\frac{9}{25}$	122 $\frac{2}{125}$
17 $\frac{1}{16}$	14 $\frac{7}{20}$	28 $\frac{7}{320}$	0·205	19 $\frac{17}{25}$	15 $\frac{93}{125}$	123 $\frac{3}{125}$
18 $\frac{3}{8}$	14 $\frac{7}{10}$	14 $\frac{7}{160}$	0·21	20 $\frac{4}{5}$	16 $\frac{16}{125}$	125 $\frac{1}{125}$
18 $\frac{13}{16}$	15 $\frac{1}{20}$	30 $\frac{1}{320}$	0·215	20 $\frac{16}{25}$	16 $\frac{64}{125}$	125 $\frac{4}{125}$
19 $\frac{1}{4}$	15 $\frac{3}{5}$	7 $\frac{7}{80}$	0·22	21 $\frac{3}{5}$	16 $\frac{112}{125}$	125 $\frac{7}{125}$
19 $\frac{1}{16}$	15 $\frac{3}{4}$	6 $\frac{3}{64}$	0·225	21 $\frac{3}{5}$	17 $\frac{7}{25}$	125 $\frac{9}{125}$
20 $\frac{1}{8}$	16 $\frac{1}{10}$	1 $\frac{1}{160}$	0·23	22 $\frac{2}{5}$	17 $\frac{83}{125}$	125 $\frac{13}{125}$
20 $\frac{9}{16}$	16 $\frac{9}{20}$	1 $\frac{9}{320}$	0·235	22 $\frac{14}{25}$	18 $\frac{6}{125}$	125 $\frac{16}{125}$
21	16 $\frac{4}{5}$	1 $\frac{1}{20}$	0·24	23 $\frac{1}{5}$	18 $\frac{54}{125}$	125 $\frac{19}{125}$
21 $\frac{7}{16}$	17 $\frac{3}{20}$	1 $\frac{23}{320}$	0·245	23 $\frac{13}{25}$	18 $\frac{102}{125}$	125 $\frac{22}{125}$
21 $\frac{7}{8}$	17 $\frac{1}{2}$	1 $\frac{3}{32}$	0·25	24	19 $\frac{1}{5}$	125 $\frac{25}{125}$
22 $\frac{5}{16}$	17 $\frac{17}{20}$	1 $\frac{37}{320}$	0·255	24 $\frac{2}{5}$	19 $\frac{73}{125}$	125 $\frac{28}{125}$
22 $\frac{3}{4}$	18 $\frac{1}{5}$	1 $\frac{1}{80}$	0·26	24 $\frac{4}{5}$	19 $\frac{121}{125}$	125 $\frac{31}{125}$
23 $\frac{3}{16}$	18 $\frac{11}{20}$	1 $\frac{51}{320}$	0·265	25 $\frac{11}{25}$	20 $\frac{44}{125}$	125 $\frac{34}{125}$
23 $\frac{5}{8}$	18 $\frac{9}{10}$	1 $\frac{29}{160}$	0·27	25 $\frac{23}{25}$	20 $\frac{92}{125}$	125 $\frac{37}{125}$
24 $\frac{1}{16}$	19 $\frac{1}{4}$	1 $\frac{13}{64}$	0·275	26 $\frac{2}{5}$	21 $\frac{3}{25}$	125 $\frac{40}{125}$
24 $\frac{1}{2}$	19 $\frac{3}{5}$	1 $\frac{9}{40}$	0·28	26 $\frac{22}{25}$	21 $\frac{63}{125}$	125 $\frac{43}{125}$
24 $\frac{1}{16}$	19 $\frac{19}{20}$	1 $\frac{79}{320}$	0·285	27 $\frac{9}{25}$	21 $\frac{111}{125}$	125 $\frac{46}{125}$
25 $\frac{3}{8}$	20 $\frac{3}{10}$	1 $\frac{43}{160}$	0·29	27 $\frac{21}{25}$	22 $\frac{34}{125}$	125 $\frac{49}{125}$
25 $\frac{1}{16}$	20 $\frac{13}{20}$	1 $\frac{93}{320}$	0·295	28 $\frac{8}{25}$	22 $\frac{82}{125}$	125 $\frac{52}{125}$
26 $\frac{1}{4}$	21	1 $\frac{5}{16}$	0·3	28 $\frac{4}{5}$	23 $\frac{1}{25}$	125 $\frac{55}{125}$
26 $\frac{1}{16}$	21 $\frac{7}{20}$	1 $\frac{107}{320}$	0·305	29 $\frac{7}{25}$	23 $\frac{53}{125}$	125 $\frac{58}{125}$
27 $\frac{1}{8}$	21 $\frac{7}{10}$	1 $\frac{57}{160}$	0·31	29 $\frac{19}{25}$	23 $\frac{101}{125}$	125 $\frac{61}{125}$
27 $\frac{9}{16}$	22 $\frac{1}{20}$	1 $\frac{121}{320}$	0·315	30 $\frac{6}{25}$	24 $\frac{24}{125}$	125 $\frac{64}{125}$
28	22 $\frac{2}{5}$	1 $\frac{2}{5}$	0·32	30 $\frac{18}{25}$	24 $\frac{72}{125}$	125 $\frac{67}{125}$
28 $\frac{7}{16}$	22 $\frac{3}{4}$	1 $\frac{27}{64}$	0·325	31 $\frac{1}{5}$	24 $\frac{24}{25}$	125 $\frac{70}{125}$
28 $\frac{7}{8}$	23 $\frac{1}{10}$	1 $\frac{71}{160}$	0·33	31 $\frac{17}{25}$	25 $\frac{43}{125}$	125 $\frac{73}{125}$
29 $\frac{5}{16}$	23 $\frac{9}{20}$	1 $\frac{149}{320}$	0·335	32 $\frac{4}{5}$	25 $\frac{91}{125}$	125 $\frac{76}{125}$
29 $\frac{3}{4}$	23 $\frac{4}{5}$	1 $\frac{39}{80}$	0·34	32 $\frac{16}{25}$	26 $\frac{14}{125}$	125 $\frac{79}{125}$
30 $\frac{3}{16}$	24 $\frac{3}{20}$	1 $\frac{163}{320}$	0·345	33 $\frac{3}{5}$	26 $\frac{62}{125}$	125 $\frac{82}{125}$
30 $\frac{5}{8}$	24 $\frac{1}{2}$	1 $\frac{17}{32}$	0·35	33 $\frac{5}{5}$	26 $\frac{22}{25}$	125 $\frac{85}{125}$
31 $\frac{1}{16}$	24 $\frac{17}{20}$	1 $\frac{77}{320}$	0·355	34 $\frac{2}{5}$	27 $\frac{38}{125}$	125 $\frac{88}{125}$
31 $\frac{1}{2}$	25 $\frac{1}{5}$	1 $\frac{23}{40}$	0·36	34 $\frac{4}{5}$	27 $\frac{81}{125}$	125 $\frac{91}{125}$
31 $\frac{1}{16}$	25 $\frac{11}{20}$	1 $\frac{191}{320}$	0·365	35 $\frac{1}{5}$	28 $\frac{4}{125}$	125 $\frac{94}{125}$
32 $\frac{3}{8}$	25 $\frac{9}{10}$	1 $\frac{99}{160}$	0·37	35 $\frac{13}{25}$	28 $\frac{52}{125}$	125 $\frac{97}{125}$
32 $\frac{1}{2}$	26 $\frac{1}{4}$	1 $\frac{41}{64}$	0·375	36	28 $\frac{4}{5}$	125 $\frac{100}{125}$
33 $\frac{1}{4}$	26 $\frac{3}{5}$	1 $\frac{23}{80}$	0·38	36 $\frac{12}{25}$	29 $\frac{23}{125}$	125 $\frac{103}{125}$
33 $\frac{1}{16}$	26 $\frac{11}{20}$	1 $\frac{219}{320}$	0·385	36 $\frac{24}{25}$	29 $\frac{71}{125}$	125 $\frac{106}{125}$

Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
$34\frac{1}{8}$	$27\frac{3}{10}$	$1\frac{11}{60}$	0·39	$37\frac{11}{25}$	$29\frac{11}{25}$	$1\frac{10}{9}$
$34\frac{9}{16}$	$27\frac{13}{20}$	$1\frac{23}{30}$	0·395	$37\frac{23}{25}$	$30\frac{42}{25}$	$1\frac{11}{25}$
35	28	$1\frac{3}{4}$	0·4	$38\frac{2}{5}$	$30\frac{18}{25}$	$1\frac{23}{25}$
$35\frac{7}{16}$	$28\frac{7}{20}$	$1\frac{24}{30}$	0·405	$38\frac{22}{25}$	$31\frac{12}{25}$	$1\frac{11}{25}$
$35\frac{7}{8}$	$28\frac{7}{10}$	$1\frac{127}{160}$	0·41	$39\frac{9}{25}$	$31\frac{61}{25}$	$1\frac{118}{25}$
$36\frac{5}{16}$	$29\frac{1}{10}$	$1\frac{261}{320}$	0·415	$39\frac{25}{25}$	$31\frac{109}{25}$	$1\frac{121}{25}$
$36\frac{3}{4}$	$29\frac{3}{5}$	$1\frac{67}{80}$	0·42	$40\frac{8}{25}$	$32\frac{32}{25}$	$1\frac{124}{25}$
$37\frac{3}{16}$	$29\frac{3}{4}$	$1\frac{55}{64}$	0·425	$40\frac{4}{5}$	$32\frac{16}{25}$	$2\frac{2}{25}$
$37\frac{5}{8}$	$30\frac{1}{10}$	$1\frac{141}{160}$	0·43	$41\frac{7}{25}$	$33\frac{3}{25}$	$2\frac{1}{25}$
$38\frac{1}{16}$	$30\frac{9}{20}$	$1\frac{289}{320}$	0·435	$41\frac{19}{25}$	$33\frac{51}{25}$	$2\frac{8}{25}$
$38\frac{1}{2}$	$30\frac{1}{5}$	$1\frac{37}{40}$	0·44	$42\frac{6}{25}$	$34\frac{99}{25}$	$2\frac{11}{25}$
$38\frac{5}{16}$	$31\frac{3}{20}$	$1\frac{303}{320}$	0·445	$42\frac{18}{25}$	$34\frac{125}{25}$	$2\frac{14}{25}$
39	$31\frac{1}{2}$	$1\frac{31}{32}$	0·45	$43\frac{1}{5}$	$34\frac{14}{25}$	$2\frac{17}{25}$
$39\frac{1}{8}$	$31\frac{17}{20}$	$1\frac{317}{320}$	0·455	$43\frac{17}{25}$	$34\frac{118}{25}$	$2\frac{4}{25}$
$40\frac{1}{4}$	$32\frac{1}{5}$	$2\frac{1}{80}$	0·46	$44\frac{4}{25}$	$35\frac{125}{25}$	$2\frac{23}{25}$
$40\frac{1}{16}$	$32\frac{11}{20}$	$2\frac{11}{320}$	0·465	$44\frac{16}{25}$	$35\frac{89}{25}$	$2\frac{125}{25}$
$41\frac{1}{8}$	$32\frac{9}{10}$	$2\frac{9}{160}$	0·47	$45\frac{3}{25}$	$36\frac{12}{25}$	$2\frac{29}{25}$
$41\frac{9}{16}$	$33\frac{1}{4}$	$2\frac{5}{64}$	0·475	$45\frac{7}{5}$	$36\frac{12}{25}$	$2\frac{32}{25}$
42	$33\frac{3}{5}$	$2\frac{1}{10}$	0·48	$46\frac{2}{25}$	$36\frac{108}{25}$	$2\frac{25}{25}$
$42\frac{7}{16}$	$33\frac{19}{20}$	$2\frac{39}{320}$	0·485	$46\frac{14}{25}$	$37\frac{31}{25}$	$2\frac{38}{25}$
$42\frac{7}{8}$	$34\frac{3}{10}$	$2\frac{23}{160}$	0·49	$47\frac{1}{25}$	$37\frac{79}{25}$	$2\frac{41}{25}$
$43\frac{5}{16}$	$34\frac{13}{20}$	$2\frac{53}{320}$	0·495	$47\frac{13}{25}$	$38\frac{2}{25}$	$2\frac{44}{25}$
$43\frac{3}{4}$	35	$2\frac{3}{16}$	0·5	48	$38\frac{2}{5}$	$2\frac{47}{25}$
$44\frac{3}{16}$	$35\frac{7}{20}$	$2\frac{67}{320}$	0·505	$48\frac{12}{25}$	$38\frac{98}{25}$	$2\frac{2}{5}$
$44\frac{5}{8}$	$35\frac{7}{10}$	$2\frac{67}{160}$	0·51	$48\frac{24}{25}$	$39\frac{21}{25}$	$2\frac{53}{25}$
$45\frac{1}{5}$	$36\frac{1}{20}$	$2\frac{81}{320}$	0·515	$49\frac{11}{25}$	$39\frac{69}{25}$	$2\frac{56}{25}$
$45\frac{1}{2}$	$36\frac{2}{5}$	$2\frac{11}{10}$	0·52	$49\frac{23}{25}$	$39\frac{117}{25}$	$2\frac{59}{25}$
$45\frac{5}{16}$	$36\frac{3}{4}$	$2\frac{19}{64}$	0·525	$50\frac{2}{5}$	$40\frac{8}{25}$	$2\frac{117}{25}$
$46\frac{3}{8}$	$37\frac{1}{10}$	$2\frac{51}{160}$	0·53	$50\frac{22}{25}$	$40\frac{88}{25}$	$2\frac{13}{25}$
$46\frac{1}{2}$	$37\frac{9}{20}$	$2\frac{109}{320}$	0·535	$51\frac{9}{25}$	$41\frac{11}{25}$	$2\frac{25}{25}$
$47\frac{1}{4}$	$37\frac{4}{5}$	$2\frac{29}{80}$	0·54	$51\frac{21}{25}$	$41\frac{59}{25}$	$2\frac{68}{25}$
$47\frac{1}{16}$	$38\frac{3}{20}$	$2\frac{123}{320}$	0·545	$52\frac{8}{25}$	$41\frac{107}{25}$	$2\frac{71}{25}$
$48\frac{1}{8}$	$38\frac{1}{2}$	$2\frac{13}{32}$	0·55	$52\frac{4}{5}$	$42\frac{6}{25}$	$2\frac{74}{25}$
$48\frac{9}{16}$	$38\frac{17}{20}$	$2\frac{137}{320}$	0·555	$52\frac{5}{25}$	$42\frac{78}{25}$	$2\frac{16}{25}$
49	$39\frac{1}{5}$	$2\frac{9}{20}$	0·56	$53\frac{7}{25}$	$43\frac{1}{25}$	$2\frac{83}{25}$
$49\frac{7}{16}$	$39\frac{11}{20}$	$2\frac{151}{320}$	0·565	$53\frac{25}{25}$	$43\frac{49}{25}$	$2\frac{125}{25}$
$49\frac{7}{8}$	$39\frac{9}{10}$	$2\frac{79}{160}$	0·57	$54\frac{18}{25}$	$43\frac{97}{25}$	$2\frac{89}{25}$
$50\frac{5}{16}$	$40\frac{1}{4}$	$2\frac{33}{64}$	0·575	$55\frac{1}{5}$	$44\frac{4}{25}$	$2\frac{92}{25}$
$50\frac{3}{4}$	$40\frac{3}{5}$	$2\frac{43}{80}$	0·58	$55\frac{7}{25}$	$44\frac{68}{25}$	$2\frac{125}{25}$
$51\frac{1}{16}$	$40\frac{19}{20}$	$2\frac{179}{320}$	0·585	$56\frac{4}{25}$	$44\frac{116}{25}$	$2\frac{19}{25}$
$51\frac{5}{8}$	$41\frac{3}{10}$	$2\frac{93}{160}$	0·59	$56\frac{16}{25}$	$45\frac{39}{25}$	$2\frac{101}{25}$
$52\frac{1}{16}$	$41\frac{13}{20}$	$2\frac{193}{320}$	0·595	$57\frac{3}{25}$	$45\frac{87}{25}$	$2\frac{125}{25}$
$52\frac{1}{2}$	42	$2\frac{5}{8}$	0·6	$57\frac{5}{25}$	$46\frac{2}{25}$	$2\frac{125}{25}$



## Percentage Equivalents—continued.

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
52 $\frac{1}{8}$	42 $\frac{7}{20}$	22 $\frac{9}{20}$	0.605	58 $\frac{2}{25}$	46 $\frac{5}{8}$	21 $\frac{1}{3}$
53 $\frac{3}{8}$	42 $\frac{7}{10}$	21 $\frac{10}{20}$	0.61	58 $\frac{1}{25}$	46 $\frac{1}{2}$	21 $\frac{2}{5}$
53 $\frac{1}{2}$	43 $\frac{1}{10}$	22 $\frac{1}{20}$	0.615	59 $\frac{1}{25}$	47 $\frac{1}{2}$	21 $\frac{3}{5}$
54 $\frac{1}{4}$	43 $\frac{2}{5}$	22 $\frac{7}{20}$	0.62	59 $\frac{1}{25}$	47 $\frac{1}{2}$	21 $\frac{3}{5}$
54 $\frac{1}{6}$	43 $\frac{3}{4}$	24 $\frac{7}{20}$	0.625	60	48	3
55 $\frac{1}{8}$	44 $\frac{1}{10}$	21 $\frac{11}{20}$	0.63	60 $\frac{1}{25}$	48 $\frac{1}{2}$	3 $\frac{1}{5}$
55 $\frac{9}{16}$	44 $\frac{9}{20}$	22 $\frac{4}{20}$	0.635	60 $\frac{1}{25}$	48 $\frac{1}{2}$	3 $\frac{1}{5}$
56	44 $\frac{1}{2}$	22 $\frac{5}{20}$	0.64	61 $\frac{1}{25}$	49 $\frac{1}{2}$	3 $\frac{2}{5}$
56 $\frac{7}{16}$	45 $\frac{3}{20}$	23 $\frac{3}{20}$	0.645	61 $\frac{1}{25}$	49 $\frac{1}{2}$	3 $\frac{2}{5}$
56 $\frac{5}{8}$	45 $\frac{1}{2}$	22 $\frac{7}{20}$	0.65	62 $\frac{1}{25}$	49 $\frac{1}{2}$	3 $\frac{3}{5}$
57 $\frac{5}{16}$	45 $\frac{7}{20}$	22 $\frac{7}{20}$	0.655	62 $\frac{1}{25}$	50 $\frac{3}{8}$	3 $\frac{1}{5}$
57 $\frac{3}{4}$	46 $\frac{1}{5}$	24 $\frac{1}{20}$	0.66	63 $\frac{1}{25}$	50 $\frac{3}{8}$	3 $\frac{2}{5}$
58 $\frac{3}{8}$	46 $\frac{1}{10}$	23 $\frac{1}{20}$	0.665	63 $\frac{1}{25}$	51 $\frac{1}{2}$	3 $\frac{2}{5}$
58 $\frac{1}{2}$	46 $\frac{9}{10}$	21 $\frac{4}{20}$	0.67	64 $\frac{1}{25}$	51 $\frac{1}{2}$	3 $\frac{2}{5}$
59 $\frac{1}{16}$	47 $\frac{1}{4}$	24 $\frac{1}{20}$	0.675	64 $\frac{1}{25}$	51 $\frac{1}{2}$	3 $\frac{2}{5}$
59 $\frac{1}{2}$	47 $\frac{3}{5}$	23 $\frac{9}{20}$	0.68	65 $\frac{1}{25}$	52 $\frac{1}{2}$	3 $\frac{3}{5}$
59 $\frac{5}{16}$	47 $\frac{9}{20}$	23 $\frac{9}{20}$	0.685	65 $\frac{1}{25}$	52 $\frac{1}{2}$	3 $\frac{3}{5}$
60 $\frac{3}{8}$	48 $\frac{3}{10}$	31 $\frac{3}{20}$	0.69	66 $\frac{1}{25}$	52 $\frac{1}{2}$	3 $\frac{3}{5}$
60 $\frac{1}{2}$	48 $\frac{1}{2}$	31 $\frac{9}{20}$	0.695	66 $\frac{1}{25}$	53 $\frac{1}{2}$	3 $\frac{4}{5}$
61 $\frac{1}{4}$	49	31 $\frac{1}{20}$	0.7	67 $\frac{1}{25}$	53 $\frac{1}{2}$	3 $\frac{4}{5}$
61 $\frac{1}{6}$	49 $\frac{7}{20}$	32 $\frac{7}{20}$	0.705	67 $\frac{1}{25}$	53 $\frac{1}{2}$	3 $\frac{4}{5}$
62 $\frac{1}{4}$	49 $\frac{7}{10}$	31 $\frac{1}{20}$	0.71	68 $\frac{1}{25}$	54 $\frac{1}{2}$	3 $\frac{5}{5}$
62 $\frac{9}{16}$	50 $\frac{1}{10}$	33 $\frac{1}{20}$	0.715	68 $\frac{1}{25}$	54 $\frac{1}{2}$	3 $\frac{5}{5}$
63	50 $\frac{2}{5}$	32 $\frac{3}{20}$	0.72	69 $\frac{1}{25}$	55 $\frac{1}{2}$	3 $\frac{5}{5}$
63 $\frac{7}{16}$	50 $\frac{3}{4}$	34 $\frac{1}{20}$	0.725	69 $\frac{1}{25}$	55 $\frac{1}{2}$	3 $\frac{5}{5}$
63 $\frac{7}{8}$	51 $\frac{1}{10}$	31 $\frac{3}{20}$	0.73	70 $\frac{1}{25}$	56 $\frac{1}{2}$	3 $\frac{6}{5}$
64 $\frac{5}{16}$	51 $\frac{9}{20}$	33 $\frac{9}{20}$	0.735	70 $\frac{1}{25}$	56 $\frac{1}{2}$	3 $\frac{6}{5}$
64 $\frac{3}{4}$	51 $\frac{4}{5}$	34 $\frac{1}{20}$	0.74	71 $\frac{1}{25}$	56 $\frac{1}{2}$	3 $\frac{6}{5}$
65 $\frac{3}{8}$	52 $\frac{3}{10}$	33 $\frac{3}{20}$	0.745	71 $\frac{1}{25}$	57 $\frac{1}{2}$	3 $\frac{7}{5}$
65 $\frac{5}{8}$	52 $\frac{1}{2}$	34 $\frac{1}{20}$	0.75	72	57 $\frac{1}{2}$	3 $\frac{7}{5}$
66 $\frac{1}{16}$	52 $\frac{7}{20}$	33 $\frac{9}{20}$	0.755	72 $\frac{1}{25}$	57 $\frac{1}{2}$	3 $\frac{7}{5}$
66 $\frac{1}{2}$	53 $\frac{1}{5}$	34 $\frac{1}{20}$	0.76	72 $\frac{1}{25}$	58 $\frac{1}{2}$	3 $\frac{8}{5}$
66 $\frac{5}{16}$	53 $\frac{1}{10}$	33 $\frac{11}{20}$	0.765	73 $\frac{1}{25}$	58 $\frac{1}{2}$	3 $\frac{8}{5}$
70 $\frac{3}{8}$	53 $\frac{9}{10}$	31 $\frac{5}{20}$	0.77	73 $\frac{1}{25}$	59 $\frac{1}{2}$	3 $\frac{9}{5}$
70 $\frac{1}{2}$	54 $\frac{1}{4}$	32 $\frac{5}{20}$	0.775	74 $\frac{1}{25}$	59 $\frac{1}{2}$	3 $\frac{9}{5}$
71 $\frac{1}{4}$	54 $\frac{3}{5}$	33 $\frac{3}{20}$	0.78	74 $\frac{1}{25}$	59 $\frac{1}{2}$	3 $\frac{9}{5}$
71 $\frac{1}{6}$	54 $\frac{1}{2}$	33 $\frac{9}{20}$	0.785	75 $\frac{1}{25}$	60 $\frac{1}{2}$	3 $\frac{10}{5}$
71 $\frac{1}{8}$	55 $\frac{3}{10}$	31 $\frac{7}{20}$	0.79	75 $\frac{1}{25}$	60 $\frac{1}{2}$	3 $\frac{10}{5}$
72 $\frac{9}{16}$	55 $\frac{1}{2}$	33 $\frac{15}{20}$	0.795	76 $\frac{1}{25}$	61 $\frac{1}{2}$	3 $\frac{11}{5}$
70	56	34 $\frac{1}{20}$	0.8	76 $\frac{1}{25}$	61 $\frac{1}{2}$	3 $\frac{11}{5}$
70 $\frac{7}{16}$	56 $\frac{7}{20}$	33 $\frac{16}{20}$	0.805	77 $\frac{1}{25}$	61 $\frac{1}{2}$	3 $\frac{11}{5}$
70 $\frac{7}{8}$	56 $\frac{7}{10}$	31 $\frac{8}{20}$	0.81	77 $\frac{1}{25}$	62 $\frac{1}{2}$	3 $\frac{12}{5}$
71 $\frac{5}{16}$	57 $\frac{1}{2}$	33 $\frac{18}{20}$	0.815	78 $\frac{1}{25}$	62 $\frac{1}{2}$	3 $\frac{12}{5}$

Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
71 $\frac{3}{4}$	57 $\frac{2}{5}$	34 $\frac{7}{8}$	0.82	78 $\frac{18}{25}$	62 $\frac{122}{25}$	31 $\frac{17}{25}$
72 $\frac{3}{16}$	57 $\frac{3}{4}$	33 $\frac{9}{4}$	0.825	79 $\frac{1}{5}$	63 $\frac{9}{25}$	3 $\frac{24}{25}$
72 $\frac{5}{8}$	58 $\frac{1}{10}$	31 $\frac{101}{60}$	0.83	79 $\frac{7}{25}$	63 $\frac{93}{25}$	31 $\frac{23}{25}$
73 $\frac{1}{16}$	58 $\frac{9}{20}$	33 $\frac{209}{20}$	0.835	80 $\frac{4}{25}$	64 $\frac{16}{25}$	41 $\frac{25}{25}$
73 $\frac{1}{2}$	58 $\frac{4}{5}$	34 $\frac{7}{10}$	0.84	80 $\frac{16}{25}$	64 $\frac{64}{25}$	41 $\frac{4}{25}$
73 $\frac{1}{8}$	59 $\frac{3}{20}$	33 $\frac{233}{20}$	0.845	81 $\frac{3}{25}$	64 $\frac{112}{25}$	41 $\frac{7}{25}$
74 $\frac{3}{8}$	59 $\frac{1}{2}$	33 $\frac{23}{2}$	0.85	81 $\frac{3}{5}$	65 $\frac{7}{25}$	4 $\frac{2}{25}$
74 $\frac{1}{16}$	59 $\frac{1}{20}$	33 $\frac{237}{20}$	0.855	82 $\frac{25}{25}$	65 $\frac{83}{25}$	41 $\frac{3}{25}$
75 $\frac{1}{4}$	60 $\frac{1}{5}$	38 $\frac{61}{80}$	0.86	82 $\frac{14}{25}$	66 $\frac{1}{25}$	41 $\frac{16}{25}$
75 $\frac{1}{16}$	60 $\frac{1}{20}$	33 $\frac{251}{20}$	0.865	83 $\frac{1}{25}$	66 $\frac{54}{25}$	41 $\frac{19}{25}$
76 $\frac{1}{8}$	60 $\frac{9}{10}$	31 $\frac{129}{60}$	0.87	83 $\frac{13}{25}$	66 $\frac{102}{25}$	41 $\frac{22}{25}$
76 $\frac{9}{16}$	61 $\frac{1}{4}$	36 $\frac{53}{4}$	0.875	84	67 $\frac{1}{5}$	4 $\frac{5}{25}$
77	61 $\frac{3}{5}$	32 $\frac{17}{10}$	0.88	84 $\frac{12}{25}$	67 $\frac{73}{25}$	41 $\frac{28}{25}$
77 $\frac{7}{16}$	61 $\frac{19}{20}$	33 $\frac{279}{20}$	0.885	84 $\frac{24}{25}$	67 $\frac{121}{25}$	41 $\frac{31}{25}$
77 $\frac{7}{8}$	62 $\frac{3}{10}$	31 $\frac{143}{60}$	0.89	85 $\frac{11}{25}$	68 $\frac{44}{25}$	41 $\frac{34}{25}$
78 $\frac{5}{16}$	62 $\frac{3}{20}$	33 $\frac{293}{20}$	0.895	85 $\frac{23}{25}$	68 $\frac{92}{25}$	41 $\frac{37}{25}$
78 $\frac{3}{4}$	63	31 $\frac{15}{6}$	0.9	86 $\frac{2}{5}$	69 $\frac{3}{25}$	4 $\frac{8}{25}$
79 $\frac{3}{16}$	63 $\frac{7}{20}$	33 $\frac{307}{20}$	0.905	86 $\frac{22}{25}$	69 $\frac{63}{25}$	41 $\frac{43}{25}$
79 $\frac{5}{8}$	63 $\frac{7}{10}$	31 $\frac{57}{60}$	0.91	87 $\frac{9}{25}$	69 $\frac{111}{25}$	41 $\frac{46}{25}$
80 $\frac{1}{16}$	64 $\frac{1}{20}$	43 $\frac{2}{20}$	0.915	87 $\frac{21}{25}$	70 $\frac{34}{25}$	41 $\frac{49}{25}$
80 $\frac{1}{2}$	64 $\frac{2}{5}$	44 $\frac{1}{10}$	0.92	88 $\frac{8}{25}$	70 $\frac{82}{25}$	41 $\frac{52}{25}$
80 $\frac{1}{8}$	64 $\frac{3}{4}$	46 $\frac{3}{4}$	0.925	88 $\frac{4}{5}$	71 $\frac{1}{25}$	4 $\frac{11}{25}$
81 $\frac{3}{8}$	65 $\frac{1}{10}$	41 $\frac{16}{10}$	0.93	89 $\frac{7}{25}$	71 $\frac{53}{25}$	41 $\frac{58}{25}$
81 $\frac{1}{16}$	65 $\frac{9}{20}$	43 $\frac{29}{20}$	0.935	89 $\frac{19}{25}$	71 $\frac{101}{25}$	41 $\frac{61}{25}$
82 $\frac{1}{4}$	65 $\frac{4}{5}$	48 $\frac{9}{5}$	0.94	90 $\frac{6}{25}$	72 $\frac{24}{25}$	41 $\frac{64}{25}$
82 $\frac{1}{16}$	66 $\frac{3}{20}$	43 $\frac{43}{20}$	0.945	90 $\frac{18}{25}$	72 $\frac{72}{25}$	41 $\frac{67}{25}$
83 $\frac{1}{8}$	66 $\frac{1}{2}$	43 $\frac{5}{2}$	0.95	91 $\frac{1}{5}$	72 $\frac{24}{25}$	4 $\frac{14}{25}$
83 $\frac{9}{16}$	66 $\frac{17}{20}$	43 $\frac{57}{20}$	0.955	91 $\frac{17}{25}$	73 $\frac{43}{25}$	41 $\frac{73}{25}$
84	67 $\frac{1}{5}$	4 $\frac{1}{5}$	0.96	92 $\frac{4}{25}$	73 $\frac{91}{25}$	41 $\frac{76}{25}$
84 $\frac{7}{16}$	67 $\frac{11}{20}$	43 $\frac{71}{20}$	0.965	92 $\frac{16}{25}$	74 $\frac{14}{25}$	41 $\frac{79}{25}$
84 $\frac{7}{8}$	67 $\frac{9}{10}$	41 $\frac{39}{10}$	0.97	93 $\frac{3}{5}$	74 $\frac{62}{25}$	41 $\frac{82}{25}$
85 $\frac{1}{16}$	68 $\frac{1}{4}$	46 $\frac{17}{4}$	0.975	93 $\frac{3}{5}$	74 $\frac{92}{25}$	4 $\frac{17}{25}$
85 $\frac{3}{8}$	68 $\frac{2}{5}$	48 $\frac{23}{5}$	0.98	94 $\frac{2}{25}$	75 $\frac{38}{25}$	41 $\frac{88}{25}$
86 $\frac{3}{16}$	68 $\frac{9}{20}$	43 $\frac{99}{20}$	0.985	94 $\frac{14}{25}$	75 $\frac{81}{25}$	41 $\frac{91}{25}$
86 $\frac{5}{8}$	69 $\frac{3}{10}$	41 $\frac{53}{10}$	0.99	95 $\frac{1}{5}$	76 $\frac{4}{25}$	4 $\frac{194}{25}$
87 $\frac{1}{16}$	69 $\frac{1}{20}$	43 $\frac{113}{20}$	0.995	95 $\frac{13}{25}$	76 $\frac{52}{25}$	41 $\frac{97}{25}$
87 $\frac{1}{2}$	70	48 $\frac{8}{5}$	1.00	96	76 $\frac{4}{5}$	4 $\frac{1}{5}$
91 $\frac{7}{8}$	73 $\frac{1}{2}$	43 $\frac{9}{2}$	1.05	100 $\frac{4}{5}$	80 $\frac{16}{25}$	5 $\frac{1}{25}$
96 $\frac{1}{4}$	77	41 $\frac{13}{6}$	1.10	105 $\frac{3}{5}$	84 $\frac{12}{25}$	5 $\frac{7}{25}$
100 $\frac{5}{8}$	80 $\frac{1}{2}$	53 $\frac{1}{2}$	1.15	110 $\frac{2}{5}$	88 $\frac{8}{25}$	5 $\frac{13}{25}$
105	84	54 $\frac{1}{5}$	1.20	115 $\frac{1}{5}$	92 $\frac{4}{5}$	5 $\frac{19}{25}$
109 $\frac{3}{8}$	87 $\frac{1}{2}$	58 $\frac{1}{2}$	1.25	120	96	6
113 $\frac{1}{4}$	91	51 $\frac{1}{6}$	1.30	124 $\frac{4}{5}$	99 $\frac{2}{5}$	6 $\frac{6}{25}$

Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
118 $\frac{1}{8}$	94 $\frac{1}{2}$	5 $\frac{29}{32}$	1·35	129 $\frac{3}{5}$	103 $\frac{17}{25}$	6 $\frac{12}{25}$
122 $\frac{1}{2}$	98	6 $\frac{1}{8}$	1·40	134 $\frac{2}{5}$	107 $\frac{13}{25}$	6 $\frac{18}{25}$
126 $\frac{7}{8}$	101 $\frac{1}{2}$	6 $\frac{11}{32}$	1·45	139 $\frac{1}{5}$	111 $\frac{9}{25}$	6 $\frac{24}{25}$
131 $\frac{1}{4}$	105	6 $\frac{9}{16}$	1·50	144	115 $\frac{1}{5}$	7 $\frac{1}{5}$
135 $\frac{5}{8}$	108 $\frac{1}{2}$	6 $\frac{25}{32}$	1·55	148 $\frac{4}{5}$	119 $\frac{1}{25}$	7 $\frac{11}{25}$
140	112	7	1·60	153 $\frac{3}{5}$	122 $\frac{22}{25}$	7 $\frac{17}{25}$
144 $\frac{3}{8}$	115 $\frac{1}{2}$	7 $\frac{7}{32}$	1·65	158 $\frac{2}{5}$	126 $\frac{18}{25}$	7 $\frac{23}{25}$
148 $\frac{3}{4}$	119	7 $\frac{7}{16}$	1·70	163 $\frac{1}{5}$	130 $\frac{14}{25}$	8 $\frac{4}{25}$
153 $\frac{1}{8}$	122 $\frac{1}{2}$	7 $\frac{11}{32}$	1·75	168	134 $\frac{2}{5}$	8 $\frac{12}{25}$
157 $\frac{1}{2}$	126	7 $\frac{7}{8}$	1·80	172 $\frac{4}{5}$	138 $\frac{6}{25}$	8 $\frac{16}{25}$
161 $\frac{7}{8}$	129 $\frac{1}{2}$	8 $\frac{3}{32}$	1·85	177 $\frac{3}{5}$	142 $\frac{2}{25}$	8 $\frac{22}{25}$
166 $\frac{1}{4}$	133	8 $\frac{5}{16}$	1·90	182 $\frac{2}{5}$	145 $\frac{33}{25}$	9 $\frac{3}{25}$
170 $\frac{5}{8}$	136 $\frac{1}{2}$	8 $\frac{17}{32}$	1·95	187 $\frac{1}{5}$	149 $\frac{19}{25}$	9 $\frac{9}{25}$
175	140	8 $\frac{3}{4}$	2·00	192	153 $\frac{3}{5}$	9 $\frac{15}{25}$
179 $\frac{3}{8}$	143 $\frac{1}{2}$	8 $\frac{11}{32}$	2·05	196 $\frac{4}{5}$	157 $\frac{1}{25}$	9 $\frac{21}{25}$
183 $\frac{3}{4}$	147	9 $\frac{3}{16}$	2·10	201 $\frac{3}{5}$	161 $\frac{7}{25}$	10 $\frac{2}{25}$
188 $\frac{1}{8}$	150 $\frac{1}{2}$	9 $\frac{13}{32}$	2·15	206 $\frac{2}{5}$	165 $\frac{3}{25}$	10 $\frac{8}{25}$
192 $\frac{1}{2}$	154	9 $\frac{5}{8}$	2·20	211 $\frac{1}{5}$	168 $\frac{24}{25}$	10 $\frac{14}{25}$
196 $\frac{5}{8}$	157 $\frac{1}{2}$	9 $\frac{27}{32}$	2·25	216	172 $\frac{4}{5}$	10 $\frac{4}{5}$
201 $\frac{1}{4}$	161	10 $\frac{1}{16}$	2·30	220 $\frac{4}{5}$	176 $\frac{16}{25}$	11 $\frac{1}{25}$
205 $\frac{5}{8}$	164 $\frac{1}{2}$	10 $\frac{9}{32}$	2·35	225 $\frac{3}{5}$	180 $\frac{12}{25}$	11 $\frac{7}{25}$
210	168	10 $\frac{1}{2}$	2·40	230 $\frac{2}{5}$	184 $\frac{8}{25}$	11 $\frac{13}{25}$
214 $\frac{3}{8}$	171 $\frac{1}{2}$	10 $\frac{23}{32}$	2·45	235 $\frac{1}{5}$	188 $\frac{4}{25}$	11 $\frac{19}{25}$
218 $\frac{3}{4}$	175	10 $\frac{15}{16}$	2·50	240	192	12
223 $\frac{1}{8}$	178 $\frac{1}{2}$	11 $\frac{5}{32}$	2·55	244 $\frac{4}{5}$	195 $\frac{21}{25}$	12 $\frac{6}{25}$
227 $\frac{1}{2}$	182	11 $\frac{3}{8}$	2·60	249 $\frac{3}{5}$	199 $\frac{17}{25}$	12 $\frac{12}{25}$
231 $\frac{7}{8}$	185 $\frac{1}{2}$	11 $\frac{9}{32}$	2·65	254 $\frac{2}{5}$	203 $\frac{13}{25}$	12 $\frac{18}{25}$
236 $\frac{1}{4}$	189	11 $\frac{13}{16}$	2·70	259 $\frac{1}{5}$	207 $\frac{9}{25}$	12 $\frac{24}{25}$
240 $\frac{5}{8}$	192 $\frac{1}{2}$	12 $\frac{1}{32}$	2·75	264	211 $\frac{1}{5}$	13 $\frac{1}{5}$
245	196	12 $\frac{1}{4}$	2·80	268 $\frac{4}{5}$	215 $\frac{1}{25}$	13 $\frac{15}{25}$
249 $\frac{3}{8}$	199 $\frac{1}{2}$	12 $\frac{5}{32}$	2·85	273 $\frac{3}{5}$	218 $\frac{22}{25}$	13 $\frac{21}{25}$
253 $\frac{3}{4}$	203	12 $\frac{11}{16}$	2·90	278 $\frac{2}{5}$	222 $\frac{18}{25}$	13 $\frac{27}{25}$
258 $\frac{1}{8}$	206 $\frac{1}{2}$	12 $\frac{29}{32}$	2·95	283 $\frac{1}{5}$	226 $\frac{14}{25}$	14 $\frac{2}{25}$
262 $\frac{1}{2}$	210	13 $\frac{1}{8}$	3·00	288	230 $\frac{2}{5}$	14 $\frac{8}{25}$
266 $\frac{7}{8}$	213 $\frac{1}{2}$	13 $\frac{1}{32}$	3·05	292 $\frac{4}{5}$	234 $\frac{6}{25}$	14 $\frac{14}{25}$
271 $\frac{1}{4}$	217	13 $\frac{9}{16}$	3·10	297 $\frac{3}{5}$	238 $\frac{2}{25}$	14 $\frac{20}{25}$
275 $\frac{5}{8}$	220 $\frac{1}{2}$	13 $\frac{25}{32}$	3·15	302 $\frac{2}{5}$	241 $\frac{28}{25}$	15 $\frac{2}{25}$
280	224	14	3·20	307 $\frac{1}{5}$	245 $\frac{24}{25}$	15 $\frac{8}{25}$
284 $\frac{3}{8}$	227 $\frac{1}{2}$	14 $\frac{7}{32}$	3·25	312	249 $\frac{8}{25}$	15 $\frac{14}{25}$
288 $\frac{3}{4}$	231	14 $\frac{7}{16}$	3·30	316 $\frac{4}{5}$	253 $\frac{12}{25}$	15 $\frac{20}{25}$
293 $\frac{1}{8}$	234 $\frac{1}{2}$	14 $\frac{21}{32}$	3·35	321 $\frac{3}{5}$	257 $\frac{7}{25}$	16 $\frac{2}{25}$
297 $\frac{1}{2}$	238	14 $\frac{7}{8}$	3·40	326 $\frac{2}{5}$	261 $\frac{2}{25}$	16 $\frac{8}{25}$
301 $\frac{7}{8}$	241 $\frac{1}{2}$	15 $\frac{3}{32}$	3·45	331 $\frac{1}{5}$	264 $\frac{24}{25}$	16 $\frac{14}{25}$



Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
306 $\frac{1}{4}$	245	15 $\frac{5}{16}$	3.50	336	268 $\frac{4}{5}$	16 $\frac{4}{5}$
310 $\frac{3}{8}$	248 $\frac{1}{2}$	15 $\frac{17}{32}$	3.55	340 $\frac{4}{5}$	272 $\frac{1}{2}$ $\frac{6}{5}$	17 $\frac{1}{2}$ $\frac{1}{5}$
315	252	15 $\frac{3}{4}$	3.60	345 $\frac{3}{5}$	276 $\frac{1}{2}$ $\frac{2}{5}$	17 $\frac{7}{5}$
319 $\frac{3}{8}$	255 $\frac{1}{2}$	15 $\frac{8}{16}$	3.65	350 $\frac{2}{5}$	280 $\frac{8}{25}$	17 $\frac{13}{25}$
323 $\frac{3}{4}$	259	16 $\frac{3}{16}$	3.70	355 $\frac{1}{5}$	284 $\frac{4}{25}$	17 $\frac{19}{25}$
328 $\frac{1}{8}$	262 $\frac{1}{2}$	16 $\frac{13}{32}$	3.75	360	288	18
332 $\frac{1}{2}$	266	16 $\frac{5}{8}$	3.80	364 $\frac{4}{5}$	291 $\frac{2}{5}$ $\frac{1}{5}$	18 $\frac{6}{25}$
336 $\frac{7}{8}$	269 $\frac{1}{2}$	16 $\frac{7}{16}$	3.85	369 $\frac{3}{5}$	295 $\frac{1}{2}$ $\frac{5}{5}$	18 $\frac{12}{25}$
341 $\frac{1}{4}$	273	17 $\frac{1}{16}$	3.90	374 $\frac{2}{5}$	299 $\frac{1}{2}$ $\frac{3}{5}$	18 $\frac{18}{25}$
345 $\frac{5}{8}$	276 $\frac{1}{2}$	17 $\frac{9}{32}$	3.95	379 $\frac{1}{5}$	303 $\frac{9}{25}$	18 $\frac{24}{25}$
350	280	17 $\frac{1}{2}$	4.00	384	307 $\frac{1}{5}$	19 $\frac{1}{5}$
354 $\frac{3}{8}$	283 $\frac{1}{2}$	17 $\frac{3}{32}$	4.05	388 $\frac{4}{5}$	311 $\frac{1}{5}$ $\frac{1}{5}$	19 $\frac{1}{2}$ $\frac{1}{5}$
358 $\frac{3}{4}$	287	17 $\frac{1}{5}$	4.10	393	314 $\frac{2}{5}$ $\frac{2}{5}$	19 $\frac{1}{2}$ $\frac{7}{5}$
363 $\frac{1}{8}$	290 $\frac{1}{2}$	18 $\frac{5}{32}$	4.15	398	318 $\frac{1}{2}$ $\frac{3}{5}$	19 $\frac{2}{25}$
367 $\frac{1}{2}$	294	18 $\frac{3}{8}$	4.20	403 $\frac{1}{5}$	322 $\frac{1}{2}$ $\frac{4}{5}$	20 $\frac{4}{25}$
371 $\frac{7}{8}$	297 $\frac{1}{2}$	18 $\frac{9}{32}$	4.25	408	326 $\frac{2}{5}$	20 $\frac{2}{5}$
376 $\frac{1}{4}$	301	18 $\frac{1}{2}$	4.30	412 $\frac{1}{5}$	330 $\frac{6}{25}$	20 $\frac{1}{2}$ $\frac{6}{25}$
380 $\frac{5}{8}$	304 $\frac{1}{2}$	19 $\frac{1}{32}$	4.35	417 $\frac{3}{5}$	334 $\frac{2}{25}$	20 $\frac{2}{25}$
385	308	19 $\frac{1}{4}$	4.40	422 $\frac{2}{5}$	337 $\frac{2}{5}$ $\frac{3}{5}$	21 $\frac{3}{25}$
389 $\frac{3}{4}$	311 $\frac{1}{2}$	19 $\frac{1}{2}$	4.45	427 $\frac{1}{5}$	341 $\frac{1}{2}$ $\frac{9}{5}$	21 $\frac{9}{25}$
393 $\frac{3}{4}$	315	19 $\frac{1}{6}$	4.50	432	345 $\frac{3}{5}$	21 $\frac{3}{5}$
398 $\frac{1}{8}$	318 $\frac{1}{2}$	19 $\frac{2}{32}$	4.55	436 $\frac{4}{5}$	349 $\frac{1}{2}$ $\frac{1}{5}$	21 $\frac{2}{5}$ $\frac{1}{5}$
402 $\frac{1}{2}$	322	20 $\frac{1}{8}$	4.60	441 $\frac{3}{5}$	353 $\frac{7}{25}$	22 $\frac{2}{25}$
406 $\frac{7}{8}$	325 $\frac{1}{2}$	20 $\frac{1}{2}$	4.65	446 $\frac{2}{5}$	357 $\frac{3}{25}$	22 $\frac{8}{25}$
411 $\frac{1}{4}$	329	20 $\frac{9}{16}$	4.70	451 $\frac{1}{5}$	360 $\frac{2}{25}$	22 $\frac{14}{25}$
415 $\frac{5}{8}$	332 $\frac{1}{2}$	20 $\frac{5}{32}$	4.75	456	364 $\frac{4}{5}$	22 $\frac{4}{5}$
420	336	21	4.80	460 $\frac{4}{5}$	368 $\frac{1}{2}$ $\frac{6}{25}$	23 $\frac{1}{2}$ $\frac{1}{5}$
424 $\frac{3}{8}$	339 $\frac{1}{2}$	21 $\frac{7}{32}$	4.85	465 $\frac{3}{5}$	372 $\frac{1}{2}$ $\frac{2}{5}$	23 $\frac{7}{25}$
428 $\frac{3}{4}$	343	21 $\frac{7}{16}$	4.90	470 $\frac{2}{5}$	376 $\frac{8}{25}$	23 $\frac{13}{25}$
433 $\frac{1}{8}$	346 $\frac{1}{2}$	21 $\frac{3}{32}$	4.95	475 $\frac{1}{5}$	380 $\frac{4}{25}$	23 $\frac{19}{25}$
437 $\frac{1}{2}$	350	21 $\frac{7}{8}$	5.00	480	384	24
441 $\frac{1}{8}$	353 $\frac{1}{2}$	22 $\frac{3}{32}$	5.05	484 $\frac{4}{5}$	387 $\frac{2}{5}$ $\frac{1}{5}$	24 $\frac{6}{25}$
446 $\frac{1}{4}$	357	22 $\frac{5}{16}$	5.10	489 $\frac{3}{5}$	391 $\frac{1}{2}$ $\frac{7}{5}$	24 $\frac{12}{25}$
450 $\frac{5}{8}$	360 $\frac{1}{2}$	22 $\frac{1}{2}$	5.15	494 $\frac{2}{5}$	395 $\frac{1}{2}$ $\frac{3}{5}$	24 $\frac{18}{25}$
455	364	22 $\frac{3}{4}$	5.20	499 $\frac{1}{5}$	399 $\frac{9}{25}$	24 $\frac{24}{25}$
459 $\frac{3}{8}$	367 $\frac{1}{2}$	22 $\frac{3}{32}$	5.25	504	403 $\frac{1}{5}$	25 $\frac{1}{5}$
463 $\frac{3}{4}$	371	23 $\frac{1}{32}$	5.30	508 $\frac{4}{5}$	407 $\frac{1}{2}$ $\frac{1}{5}$	25 $\frac{1}{2}$ $\frac{1}{5}$
468 $\frac{1}{8}$	374 $\frac{1}{2}$	23 $\frac{1}{16}$	5.35	513 $\frac{3}{5}$	410 $\frac{2}{5}$ $\frac{2}{5}$	25 $\frac{1}{2}$ $\frac{7}{5}$
472 $\frac{1}{2}$	378	23 $\frac{5}{8}$	5.40	518 $\frac{2}{5}$	414 $\frac{1}{2}$ $\frac{3}{5}$	25 $\frac{2}{25}$
476 $\frac{7}{8}$	381 $\frac{1}{2}$	23 $\frac{7}{32}$	5.45	523 $\frac{1}{5}$	418 $\frac{1}{2}$ $\frac{4}{5}$	26 $\frac{4}{25}$
481 $\frac{1}{4}$	385	24 $\frac{1}{16}$	5.50	528	622 $\frac{2}{5}$	26 $\frac{2}{5}$
485 $\frac{5}{8}$	388 $\frac{1}{2}$	24 $\frac{9}{32}$	5.55	532 $\frac{4}{5}$	426 $\frac{6}{25}$	26 $\frac{1}{2}$ $\frac{6}{25}$
490	392	24 $\frac{1}{2}$	5.60	537 $\frac{3}{5}$	430 $\frac{2}{5}$	26 $\frac{2}{25}$

Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
494 $\frac{3}{8}$	395 $\frac{1}{2}$	24 $\frac{23}{32}$	5·65	542 $\frac{2}{5}$	435 $\frac{23}{32}$	27 $\frac{3}{5}$
498 $\frac{3}{4}$	399	24 $\frac{15}{16}$	5·70	547 $\frac{1}{5}$	437 $\frac{19}{25}$	27 $\frac{9}{25}$
503 $\frac{1}{8}$	402 $\frac{1}{2}$	25 $\frac{5}{8}$	5·75	552	441 $\frac{3}{5}$	27 $\frac{3}{5}$
507 $\frac{1}{2}$	406	25 $\frac{3}{8}$	5·80	556 $\frac{4}{5}$	445 $\frac{1}{2}$	27 $\frac{1}{2}$
511 $\frac{7}{8}$	409 $\frac{1}{2}$	25 $\frac{9}{16}$	5·85	561 $\frac{3}{5}$	449 $\frac{7}{25}$	28 $\frac{2}{5}$
516 $\frac{1}{4}$	413	25 $\frac{13}{16}$	5·90	566 $\frac{2}{5}$	453 $\frac{3}{5}$	28 $\frac{3}{5}$
520 $\frac{5}{8}$	416 $\frac{1}{2}$	26 $\frac{1}{32}$	5·95	571 $\frac{1}{5}$	456 $\frac{23}{25}$	28 $\frac{4}{25}$
525	420	26 $\frac{1}{4}$	6·00	576	460 $\frac{1}{5}$	28 $\frac{4}{5}$
529 $\frac{3}{8}$	423 $\frac{1}{2}$	26 $\frac{15}{32}$	6·05	580 $\frac{4}{5}$	464 $\frac{6}{25}$	29 $\frac{1}{25}$
533 $\frac{3}{4}$	427	26 $\frac{11}{16}$	6·10	585	468 $\frac{12}{25}$	29 $\frac{7}{25}$
538 $\frac{1}{8}$	430 $\frac{1}{2}$	26 $\frac{29}{32}$	6·15	590	472 $\frac{8}{25}$	29 $\frac{18}{25}$
542 $\frac{1}{2}$	434	27 $\frac{1}{8}$	6·20	595 $\frac{1}{5}$	476 $\frac{4}{5}$	29 $\frac{19}{25}$
546 $\frac{7}{8}$	437 $\frac{1}{2}$	27 $\frac{1}{8}$	6·25	600	480	30
551 $\frac{1}{4}$	441	27 $\frac{9}{16}$	6·30	604 $\frac{4}{5}$	483 $\frac{1}{5}$	30 $\frac{6}{25}$
555 $\frac{3}{8}$	444 $\frac{1}{2}$	27 $\frac{5}{8}$	6·35	609 $\frac{3}{5}$	487 $\frac{17}{25}$	30 $\frac{12}{25}$
560	448	28	6·40	614	491 $\frac{13}{25}$	30 $\frac{18}{25}$
564 $\frac{3}{8}$	451 $\frac{1}{2}$	28 $\frac{7}{32}$	6·45	619 $\frac{1}{5}$	495 $\frac{9}{25}$	30 $\frac{24}{25}$
568 $\frac{3}{4}$	455	28 $\frac{7}{16}$	6·50	624	499 $\frac{1}{5}$	31 $\frac{1}{5}$
573 $\frac{1}{8}$	458 $\frac{1}{2}$	28 $\frac{29}{32}$	5·55	628 $\frac{4}{5}$	503 $\frac{1}{5}$	31 $\frac{1}{25}$
577 $\frac{1}{2}$	462	28 $\frac{7}{8}$	6·60	633	506 $\frac{23}{25}$	31 $\frac{17}{25}$
581 $\frac{7}{8}$	465 $\frac{1}{2}$	29 $\frac{3}{32}$	6·65	638 $\frac{5}{5}$	510 $\frac{18}{25}$	31 $\frac{18}{25}$
586 $\frac{1}{4}$	469	29 $\frac{5}{16}$	6·70	643 $\frac{1}{5}$	514 $\frac{14}{25}$	32 $\frac{4}{25}$
590 $\frac{5}{8}$	472 $\frac{1}{2}$	29 $\frac{17}{32}$	6·75	648	518 $\frac{12}{25}$	32 $\frac{12}{25}$
595	476	29 $\frac{3}{4}$	6·80	652 $\frac{4}{5}$	522 $\frac{6}{25}$	32 $\frac{16}{25}$
599 $\frac{3}{8}$	479 $\frac{1}{2}$	29 $\frac{31}{32}$	6·85	657 $\frac{3}{5}$	526 $\frac{12}{25}$	32 $\frac{22}{25}$
603 $\frac{3}{4}$	483	30 $\frac{3}{8}$	6·90	662 $\frac{2}{5}$	529 $\frac{23}{25}$	33 $\frac{3}{25}$
608 $\frac{1}{8}$	486 $\frac{1}{2}$	30 $\frac{13}{32}$	6·95	667 $\frac{1}{5}$	533 $\frac{19}{25}$	33 $\frac{9}{25}$
612 $\frac{1}{2}$	490	30 $\frac{5}{8}$	7·00	672	537 $\frac{3}{5}$	33 $\frac{3}{5}$
616 $\frac{7}{8}$	493 $\frac{1}{2}$	30 $\frac{7}{32}$	7·05	676 $\frac{4}{5}$	541 $\frac{11}{25}$	33 $\frac{21}{25}$
621 $\frac{1}{4}$	497	31 $\frac{1}{16}$	7·10	681 $\frac{3}{5}$	545 $\frac{7}{25}$	34 $\frac{2}{25}$
625 $\frac{5}{8}$	500 $\frac{1}{2}$	31 $\frac{9}{32}$	7·15	686 $\frac{2}{5}$	549 $\frac{3}{25}$	34 $\frac{8}{25}$
630	504	31 $\frac{1}{2}$	7·20	691 $\frac{1}{5}$	552 $\frac{24}{25}$	34 $\frac{14}{25}$
634 $\frac{3}{8}$	507 $\frac{1}{2}$	31 $\frac{29}{32}$	7·25	696	556 $\frac{4}{5}$	34 $\frac{4}{5}$
638 $\frac{3}{4}$	511	31 $\frac{15}{16}$	7·30	700 $\frac{4}{5}$	560 $\frac{6}{25}$	35 $\frac{2}{25}$
643 $\frac{1}{8}$	514 $\frac{1}{2}$	32 $\frac{5}{32}$	7·35	705 $\frac{3}{5}$	564 $\frac{12}{25}$	35 $\frac{7}{25}$
647 $\frac{1}{2}$	518	32 $\frac{3}{8}$	7·40	710 $\frac{2}{5}$	568 $\frac{8}{25}$	35 $\frac{13}{25}$
651 $\frac{7}{8}$	521 $\frac{1}{2}$	32 $\frac{9}{16}$	7·45	715 $\frac{1}{5}$	572 $\frac{4}{25}$	35 $\frac{19}{25}$
656 $\frac{1}{4}$	525	32 $\frac{13}{16}$	7·50	720	576	36
660 $\frac{5}{8}$	528 $\frac{1}{2}$	33 $\frac{1}{32}$	7·55	724 $\frac{4}{5}$	579 $\frac{21}{25}$	36 $\frac{6}{25}$
665	532	33 $\frac{1}{4}$	7·60	729	583 $\frac{17}{25}$	36 $\frac{12}{25}$
669 $\frac{3}{8}$	535 $\frac{1}{2}$	33 $\frac{5}{16}$	7·65	734	587 $\frac{13}{25}$	36 $\frac{18}{25}$
673 $\frac{3}{4}$	539	33 $\frac{11}{16}$	7·70	739 $\frac{1}{5}$	591 $\frac{9}{25}$	36 $\frac{24}{25}$
678 $\frac{1}{8}$	542 $\frac{1}{2}$	33 $\frac{29}{32}$	7·75	744	595 $\frac{1}{5}$	37 $\frac{1}{5}$

Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
682 $\frac{1}{2}$	546	34 $\frac{1}{8}$	7·80	748 $\frac{4}{5}$	599 $\frac{1}{5}$	37 $\frac{1}{5}$
686 $\frac{1}{2}$	549 $\frac{1}{2}$	34 $\frac{1}{4}$	7·85	753 $\frac{3}{5}$	602 $\frac{2}{5}$	37 $\frac{1}{5}$
691 $\frac{1}{2}$	553	34 $\frac{1}{6}$	7·90	758 $\frac{2}{5}$	606 $\frac{1}{5}$	37 $\frac{2}{5}$
695 $\frac{1}{2}$	556 $\frac{1}{2}$	34 $\frac{1}{3}$	7·95	763 $\frac{1}{5}$	610 $\frac{1}{5}$	38 $\frac{1}{5}$
700	560	35	8·00	768	614 $\frac{2}{5}$	38 $\frac{2}{5}$
704 $\frac{1}{2}$	563 $\frac{1}{2}$	35 $\frac{1}{2}$	8·05	772 $\frac{1}{5}$	618 $\frac{3}{5}$	38 $\frac{3}{5}$
708 $\frac{1}{2}$	567	35 $\frac{1}{3}$	8·10	777 $\frac{2}{5}$	622 $\frac{4}{5}$	38 $\frac{4}{5}$
713 $\frac{1}{2}$	570 $\frac{1}{2}$	35 $\frac{1}{2}$	8·15	782 $\frac{3}{5}$	625 $\frac{1}{5}$	39 $\frac{1}{5}$
717 $\frac{1}{2}$	574	35 $\frac{1}{3}$	8·20	787 $\frac{4}{5}$	629 $\frac{2}{5}$	39 $\frac{2}{5}$
721 $\frac{1}{2}$	577 $\frac{1}{2}$	36 $\frac{1}{2}$	8·25	792	633 $\frac{3}{5}$	39 $\frac{3}{5}$
726 $\frac{1}{2}$	581	36 $\frac{1}{3}$	8·30	796 $\frac{4}{5}$	637 $\frac{4}{5}$	39 $\frac{4}{5}$
730 $\frac{1}{2}$	584 $\frac{1}{2}$	36 $\frac{1}{2}$	8·35	801 $\frac{1}{5}$	641 $\frac{1}{5}$	40 $\frac{1}{5}$
735	588	36 $\frac{1}{3}$	8·40	806 $\frac{2}{5}$	645 $\frac{2}{5}$	40 $\frac{2}{5}$
739 $\frac{1}{2}$	591 $\frac{1}{2}$	36 $\frac{1}{2}$	8·45	811 $\frac{3}{5}$	648 $\frac{3}{5}$	40 $\frac{3}{5}$
743 $\frac{1}{2}$	595	37 $\frac{1}{2}$	8·50	816	652 $\frac{4}{5}$	40 $\frac{4}{5}$
748 $\frac{1}{2}$	598 $\frac{1}{2}$	37 $\frac{1}{3}$	8·55	820 $\frac{1}{5}$	656 $\frac{1}{5}$	41 $\frac{1}{5}$
752 $\frac{1}{2}$	602	37 $\frac{1}{3}$	8·60	825 $\frac{2}{5}$	660 $\frac{2}{5}$	41 $\frac{2}{5}$
756 $\frac{1}{2}$	605 $\frac{1}{2}$	37 $\frac{1}{2}$	8·65	830 $\frac{3}{5}$	664 $\frac{3}{5}$	41 $\frac{3}{5}$
761 $\frac{1}{2}$	609	38 $\frac{1}{2}$	8·70	835 $\frac{4}{5}$	668 $\frac{4}{5}$	41 $\frac{4}{5}$
765 $\frac{1}{2}$	612 $\frac{1}{2}$	38 $\frac{1}{3}$	8·75	840	672	42
770	616	38 $\frac{1}{3}$	8·80	844 $\frac{1}{5}$	675 $\frac{1}{5}$	42 $\frac{1}{5}$
774 $\frac{1}{2}$	619 $\frac{1}{2}$	38 $\frac{1}{2}$	8·85	849 $\frac{2}{5}$	679 $\frac{2}{5}$	42 $\frac{2}{5}$
778 $\frac{1}{2}$	623	38 $\frac{1}{2}$	8·90	854 $\frac{3}{5}$	683 $\frac{3}{5}$	42 $\frac{3}{5}$
783 $\frac{1}{2}$	626 $\frac{1}{2}$	39 $\frac{1}{2}$	8·95	859 $\frac{4}{5}$	687 $\frac{4}{5}$	42 $\frac{4}{5}$
787 $\frac{1}{2}$	630	39 $\frac{1}{3}$	9·00	864	691 $\frac{1}{5}$	43 $\frac{1}{5}$
791 $\frac{1}{2}$	633 $\frac{1}{2}$	39 $\frac{1}{3}$	9·05	868 $\frac{2}{5}$	695 $\frac{2}{5}$	43 $\frac{2}{5}$
796 $\frac{1}{2}$	637	39 $\frac{1}{3}$	9·10	873 $\frac{3}{5}$	698 $\frac{3}{5}$	43 $\frac{3}{5}$
800 $\frac{1}{2}$	640 $\frac{1}{2}$	40 $\frac{1}{2}$	9·15	878 $\frac{4}{5}$	702 $\frac{4}{5}$	43 $\frac{4}{5}$
805	644	40 $\frac{1}{3}$	9·20	883 $\frac{1}{5}$	706 $\frac{1}{5}$	44 $\frac{1}{5}$
809 $\frac{1}{2}$	647 $\frac{1}{2}$	40 $\frac{1}{3}$	9·25	888	710 $\frac{2}{5}$	44 $\frac{2}{5}$
813 $\frac{1}{2}$	651	40 $\frac{1}{3}$	9·30	892 $\frac{3}{5}$	714 $\frac{3}{5}$	44 $\frac{3}{5}$
818 $\frac{1}{2}$	654 $\frac{1}{2}$	40 $\frac{1}{2}$	9·35	897 $\frac{4}{5}$	718 $\frac{4}{5}$	44 $\frac{4}{5}$
822 $\frac{1}{2}$	658	41 $\frac{1}{2}$	9·40	902 $\frac{1}{5}$	721 $\frac{1}{5}$	45 $\frac{1}{5}$
826 $\frac{1}{2}$	661 $\frac{1}{2}$	41 $\frac{1}{2}$	9·45	907 $\frac{2}{5}$	725 $\frac{2}{5}$	45 $\frac{2}{5}$
831 $\frac{1}{2}$	665	41 $\frac{1}{2}$	9·50	912	729 $\frac{3}{5}$	45 $\frac{3}{5}$
835 $\frac{1}{2}$	668 $\frac{1}{2}$	41 $\frac{1}{2}$	9·55	916 $\frac{4}{5}$	733 $\frac{4}{5}$	45 $\frac{4}{5}$
840	672	42	9·60	921 $\frac{1}{5}$	737 $\frac{1}{5}$	46 $\frac{1}{5}$
844 $\frac{1}{2}$	675 $\frac{1}{2}$	42 $\frac{1}{2}$	9·65	926 $\frac{2}{5}$	741 $\frac{2}{5}$	46 $\frac{2}{5}$
848 $\frac{1}{2}$	679	42 $\frac{1}{2}$	9·70	931 $\frac{3}{5}$	744 $\frac{3}{5}$	46 $\frac{3}{5}$
853 $\frac{1}{2}$	682 $\frac{1}{2}$	42 $\frac{1}{2}$	9·75	936	748 $\frac{4}{5}$	46 $\frac{4}{5}$
857 $\frac{1}{2}$	686	42 $\frac{1}{2}$	9·80	940 $\frac{1}{5}$	752 $\frac{1}{5}$	47 $\frac{1}{5}$
861 $\frac{1}{2}$	689 $\frac{1}{2}$	43 $\frac{1}{2}$	9·85	945 $\frac{2}{5}$	756 $\frac{2}{5}$	47 $\frac{2}{5}$
866 $\frac{1}{2}$	693	43 $\frac{1}{2}$	9·90	950 $\frac{3}{5}$	760 $\frac{3}{5}$	47 $\frac{3}{5}$



Percentage Equivalents—*continued.*

Grains in Pint.	Grains in Pound.	Grains in Ounce.	Parts in 100.	Minims in Pint.	Minims in Pound.	Minims in Ounce.
870 $\frac{5}{8}$	696 $\frac{1}{2}$	43 $\frac{1}{3}\frac{7}{2}$	9.95	955 $\frac{1}{5}$	76 $\frac{4}{25}$	47 $\frac{1}{2}\frac{9}{5}$
875	700	43 $\frac{3}{4}$	10.00	960	7684	48
1093 $\frac{3}{4}$	875	54 $\frac{1}{16}$	12.50	1200	960	60
1312 $\frac{1}{2}$	1050	65 $\frac{5}{8}$	15.00	1440	1152	72
1531 $\frac{1}{4}$	1225	76 $\frac{9}{16}$	17.50	1680	1344	84
1750	1400	87 $\frac{1}{2}$	20.00	1920	1536	96
1968 $\frac{3}{4}$	1575	98 $\frac{7}{16}$	22.50	2160	1728	108
2187 $\frac{1}{2}$	1750	109 $\frac{3}{8}$	25.00	2400	1920	120
2406 $\frac{1}{4}$	1925	120 $\frac{1}{16}$	27.50	2640	2112	132
2625	2100	131 $\frac{1}{4}$	30.00	2880	2304	144
2843 $\frac{3}{4}$	2275	142 $\frac{3}{16}$	32.50	3120	2496	156
3062 $\frac{1}{2}$	2450	153 $\frac{1}{8}$	35.00	3360	2688	168
3281 $\frac{1}{4}$	2625	164 $\frac{1}{16}$	37.50	3600	2880	180
3500	2800	175	40.00	3840	3072	192
3718 $\frac{3}{4}$	2975	185 $\frac{1}{16}$	42.50	4080	3264	204
3937 $\frac{1}{2}$	3150	196 $\frac{7}{8}$	45.00	4320	3456	216
4156 $\frac{1}{4}$	3325	207 $\frac{1}{16}$	47.50	4560	3648	228
4375	3500	218 $\frac{3}{4}$	50.00	4800	3840	240
4593 $\frac{3}{4}$	3675	229 $\frac{1}{16}$	52.50	5040	4032	252
4812 $\frac{1}{2}$	3850	240 $\frac{5}{8}$	55.00	5280	4224	264
5031 $\frac{1}{4}$	4025	251 $\frac{9}{16}$	57.50	5520	4416	276
5250	4200	262 $\frac{1}{2}$	60.00	5760	4608	288
5468 $\frac{3}{4}$	4375	273 $\frac{7}{16}$	62.50	6000	4800	300
5687 $\frac{1}{2}$	4550	284 $\frac{3}{8}$	65.00	6240	4992	312
5906 $\frac{1}{4}$	4725	295 $\frac{5}{16}$	67.50	6480	5184	324
6125	4900	306 $\frac{1}{4}$	70.00	6720	5376	336
6343 $\frac{3}{4}$	5075	317 $\frac{9}{16}$	72.50	6960	5568	348
6562 $\frac{1}{2}$	5250	328 $\frac{1}{8}$	75.00	7200	5760	360
6781 $\frac{1}{4}$	5425	339 $\frac{1}{16}$	77.50	7440	5952	372
7000	5600	350	80.00	7680	6144	384
7218 $\frac{3}{4}$	5775	360 $\frac{1}{16}$	82.50	7920	6336	396
7437 $\frac{1}{2}$	5950	371 $\frac{7}{8}$	85.00	8160	6528	408
7656 $\frac{1}{4}$	6125	382 $\frac{1}{16}$	87.50	8400	6720	420
7875	6300	393 $\frac{3}{4}$	90.00	8640	6912	432
8093 $\frac{3}{4}$	6475	404 $\frac{1}{16}$	92.50	8880	7104	444
8312 $\frac{1}{2}$	6650	415 $\frac{5}{8}$	95.00	9120	7296	456
8531 $\frac{1}{4}$	6825	426 $\frac{9}{16}$	97.50	9360	7488	468
8750	7000	437 $\frac{1}{2}$	100.00	9600	7680	480

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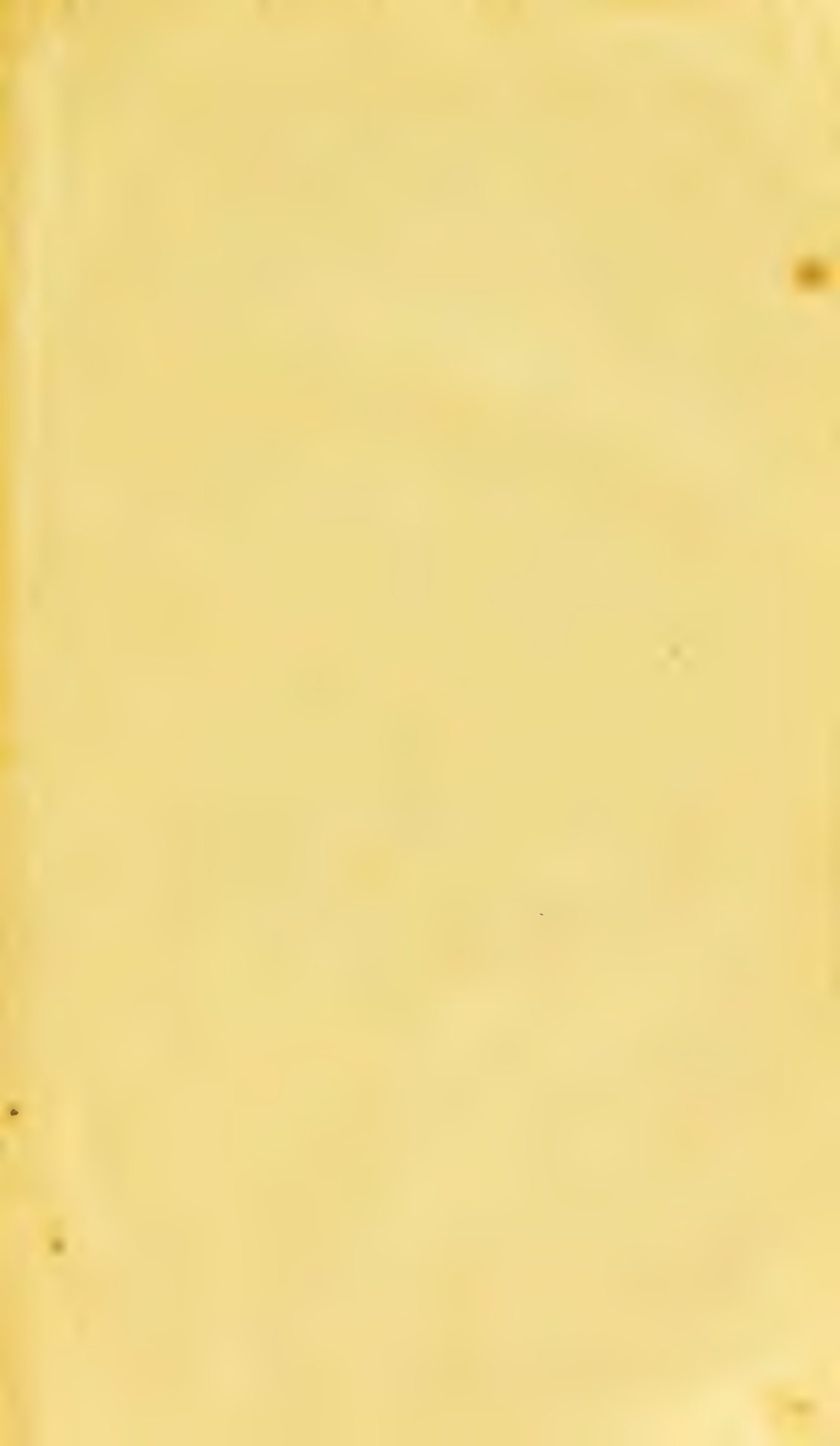
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SUPPLEMENT  
TO THE  
BRITISH PHARMACEUTICAL  
CODEX, 1907

*INCLUDING ADDITIONS, ALTERATIONS, AND  
CORRECTIONS*



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## Preface.

THIS Supplement to the British Pharmaceutical Codex, 1907, contains particulars of the more important additions and alterations which have been proposed since the work was published, including many new and altered formulæ which pharmacists are invited to test and report upon before they are included in a new edition of the Codex. The numerous additions to the Codex have been rendered necessary by the continual advance in medical and pharmaceutical science; the suggested alterations in the text are based upon recent research, and fuller and more accurate information on various points; the modifications in formulæ are the outcome of much practical work by experienced practical pharmacists. Since the publication of the Codex the work has been subjected to a vast amount of criticism, mostly, but not in all cases, of a friendly and constructive character; for the assistance thus rendered in the direction of improving the book as a work of reference thanks are due. It must be pointed out, however, that many of the suggestions put forward have proved valueless, because they were evidently based upon experiments in which unsuitable material was employed, while in some few instances suitable material appears to have been employed in a manner that suggested lack of skill on the part of the operator. Emphasis must be laid upon the fact that the use of the best obtainable materials is essential in order to obtain satisfactory results with the special Codex formulæ, just as in the case of official preparations. It is useless, for example, to expect to obtain satisfactory medicated collodions if the pyroxalin employed has been prepared especially for photographic purposes. In like manner, it is necessary that such compounds as glycerophosphates, hypophosphites, lactates, etc., should be of the highest standard of purity for pharmaceutical use.

A further point to which brief reference must be made is that some of the Codex processes are said not to adapt themselves readily to manufacture on the large scale; inasmuch, however, as one of the chief objects of the compiler was to enable pharmacists to produce the preparations in convenient small quantities, it is only necessary to state that the processes in question have, as a rule, been found to work satisfactorily when tested by practising pharmacists in different parts of the British Empire. One common source of error in compounding Codex preparations on the small scale has been an imperfect understanding of the system upon which the formulæ are based. Thus, some operators have interpreted the rule that "all liquids should be measured by weight" as specifically indicated as implying that when grains of solids are taken, the figures representing the quantities of liquid should be regarded as representing minims. Such, however, is not the case, the liquid

measure corresponding to the grain being the fluid-grain (the volume of a grain of water), just as the liquid measure corresponding to the ounce is the fluid-ounce (= 437.5 grains of water). Needless confusion is also caused in compounding preparations by regarding the apothecaries' drachm (60 grains) as the eighth part of an ounce, whereas 0.125 ounce corresponds to 54.6875 grains; the drachm weight should never be used in compounding, but only in dispensing medical prescriptions. The simplest method of avoiding all difficulties of this kind is to use decimal weights and measures, but the risk of error can also be avoided by a table of percentage equivalents, which will be found at the end of the Supplement.

With regard to the unofficial formulæ in the Codex, criticism has been directed to the fact that similar formulæ to those which appear in older works of reference; that, however, is a strict and correct original scheme for the production of an Imperial Dispensatory, and it is not desired to claim originality except where it is fully justified, as in cases where no satisfactory working formula had previously been published. Apart from that, it may be pointed out that the published formulæ for galenical preparations have, in numerous instances, been found to be incomplete and unworkable, having apparently been put forward without being tested, or copied from untrustworthy sources. Moreover, attention must be directed to a regrettable tendency to include in certain works of reference formulæ which indicate generally the composition of preparations for which there is a demand, though such information is not provided as would enable pharmacists to compound the preparations. In conclusion, it is only necessary to add that the notes, monographs, and formulæ in this Supplement have been arranged in strict alphabetical order, with ample cross references, so that the necessity for a separate index is obviated; it will, therefore, be found convenient, for reference purposes, if the Supplement is fastened inside the cover of the Codex, immediately following the index.

AUGUST 1, 1908.





- \*Morphinæ Hydrochloridum, p. 726, l. 1; after "morphine" add "hydrochloride," and (l. 36) for " $\frac{1}{2}$ " read " $\frac{1}{8}$ ."
- Moschus, p. 729, l. 10 for "18" read "10."
- \*Nebula Alkalina Composita, p. 742, l. 17; delete "mils."
- Nebula Benzoini Composita, p. 742, l. 44; delete "mils."
- Oleum Cetacei, p. 769, l. 17; for " $\frac{1}{10}$ " read " $\frac{1}{100}$ ."
- Oleum Graminis Citrati, p. 780, l. 39; for "*S. citratus*, Linn." read "*citratus*, DC."
- Oleum Sesami, p. 780, l. 39; for "*S. sesamum*, Linn." read "*sesamum*, DC."
- Opium, p. 780, l. 39; for "10" read "12.5 per cent."
- Peptonata, p. 780, l. 39; for "10" read "Peptonata."
- Pilula Colocynthis et Hyoscyami, p. 878, l. 18; for "Hyoscyami" read "Hyoscyami."
- Pilula Scammonii et Strychnina, p. 885, l. 1; for "Quininæ" read "Quinina."
- Gallani Composita, p. 885, l. 36; for "centigrams" read "decigrams."
- Pilula Hyoscyami, p. 886, l. 15; for "decigrams" read "centigrams."
- Pilula Podophylli et Belladonnæ et Nucis Vomicae, p. 889, l. 33; for "Podophylli" read "Podophyllini."
- Pilula Podophylli Composita, p. 890, l. 1; for "Podophylli" read "Podophyllini."
- Pilula Scammonii Composita, p. 892, l. 16; for "4" read "0.5."
- Pilula Zinci Valerianatis Composita, p. 893, l. 13; for "2 grains" read "1 grain."
- Piper Nigrum, p. 895, l. 46; for "of" read "or."
- Piperazina, p. 897, l. 2; for "Piperazinum" read "Piperazina."
- Piperazinum Effervescens, p. 897, l. 20; for "Piperazinum" read "Piperazina," and (l. 29) for "6 to 18" read "60 to 180."
- Podophylli Rhizoma, p. 909, l. 41; for "Ranunculaceæ" read "Berberideæ."
- \*Potassii Formas, p. 921, l. 43; for "Formatis Compositum" read "Formatum cum Strychnina."
- Pulvis Alkalina Composita, p. 935, l. 1; for "Alkalina Composita" read "Alkalinus Compositus."
- Pulvis Cretæ Compositus, p. 938, l. 26; for "20" read "30."
- \*Pulvis Magnesiae Borocitratis Compositus, p. 941, l. 11; for "Magnesiæ" read "Magnesii."
- Pulvis Mentholi Compositus, p. 942, l. 1; before "Menthol" insert "Compound."
- Pulvis Suprarenali Compositus, p. 947, l. 1; for "Suprarenali" read "Suprarenalis."
- Quininæ Hydrochloridum, p. 947, l. 1; after "hours," add "dissolve."
- Rheum, p. 947, l. 1; for "8 per cent" read "A 20 per cent."
- Sal Alembroth, p. 985, l. 1; for "339.60" read "342.176."
- \*Sal Peptici, p. 985, l. 1; for "Alembroth" read "Alembroth Salt."
- Saponinum, p. 1002, l. 1; for "Pepsini" read "Pepsini."
- Sevum Preparatum, p. 1002, l. 1; for "Sevum" read "Saponinum."
- Sodii Chloridum, p. 1035, l. 15; for "about 0.90" read "0.95."
- Sodii Fluoridum, p. 1035, l. 36; for " $3\text{NaFAlF}_3$ " read " $3\text{NaF}, \text{AlF}_3$ "; and (l. 36) for " $6\text{NaFNa}_2\text{B}_2\text{O}_4$ " read " $6\text{NaF}, \text{Na}_2\text{B}_2\text{O}_4$ ."
- Sodii Formas, p. 103 l. 9; for "It" read "Formic acid."
- Sodium Nitris, p. 104 l. 46; for "30" read "12," and for "5" read "2."
- Sodii Pyrophosphas, p. 1048, l. 30; for "20" read "60."
- Suppositoria Glycerii, p. 1104, l. 39; after "glycerin" add "by weight."
- Suppositoria Ranundus Ficarizæ, p. 1106, l. 31; for "Ranunculus" read "Ranunculi."
- Syrupus Chloral, p. 113, l. 25; for "18.29" read "18.286."
- Syrupis Ferri Bromid, p. 1115, l. 4; after "Bromine," add "by weight."
- Syrupis Ferri Iodidi, p. 1117, l. 9; for "1" read "10."

- Syrupus Ferri Phosphatis Compositus, p. 1118, l. 6; or "carbonate" read "bicarbonate."
- Syrupus Glycerophosphatis cum Formatibus, p. 1121, l. 5; for "Glycerophosphatis" read "Glycerophosphatum," and (l. 3 for "15 to 60" read "4 to 8."
- \*Syrupus Ipecacuanhæ, p. 1123, l. 22; for "1'33" read "1'3."
- Syrupus Mori, p. 1125, l. 18; for "Mulberry" read "alberry."
- Tabellæ, p. 1133, l. 23; for "3" read "10"; for "10" add "except in the case of cocaine, except in the case of the following, where the quantities are given for single tablets."
- Tablettæ Acidi Salacetini, p. 1135, l. 16; for "16" read "10" and (l. 26 for "liberated" read "formic."
- Tablettæ Phenolphthaleini Compositus, p. 1142, l. 1; for "Compositæ,"
- Tablettæ Zingiberis Compositæ, p. 1147, l. 9; for "80'00" read "80'00."
- Talcum Purificatum, p. 1147, l. 45; delete "mils."
- Terebinthina Canadensis, p. 1151, l. 29; for "oil" read "turpentine."
- Thymus Siccus, p. 1164, l. 26; for "Thymi" read "Thymæ."
- Thyroideæ Glandulæ, p. 1165, l. 6; for "thyreoglobulin" read "thyroglobulin," and (l. 10 for "iodothylin" read "thyroidin."
- Tinctura Aconiti Fortis, p. 1167, l. 15; for "2'5" read "sufficient."
- Tinctura Belladonnæ, p. 1172, l. 26; for "6'25" read "6'66."
- Tinctura Chloroformi et Morphinæ Composita, p. 1180, l. 19; delete "Composita."
- Tinctura Cinchonæ, p. 1180, l. 44; after "described" add "in the B.P."
- Tinctura Conii, p. 1184, l. 32; for "alkaloids" read "alkaloidal hydrochlorides."
- Tinctura Euonymi, p. 1188, l. 4; for "10'00" read "20'00."
- Tinctura Jalapæ, p. 1194, l. 21; after "Alcohol" add "(70 per cent.)."
- Tinctura Pyrethri, p. 1206, l. 13; for "50" read "40," and (l. 14) after "Alcohol" add "(70 per cent.)," and (l. 15) for "80" read "15."
- Tinctura Stramonii, p. 1210, l. 39; for "atropine" read "hyoscyamine."
- Toluene, p. 1216, l. 16; for "Toluene" read "Toluenum."
- Trochisci, p. 1220, l. 42, and p. 1221, l. 5, for "93'20" read "99'20"; and (p. 1221, l. 32) for "melting together" read "heating on a water-bath."
- \*Ulmi Fulvæ, p. 1235, l. 31; for "Ulmis" read "Ulmus."
- Unguentum Cupri Oleatis, p. 1246, l. 14; for "Mix" read "Melt."
- Uvæ, p. 1268, l. 26; for "Ampelidæ" read "Ampelidæ," and (l. 30) after "purplish-black" add "(Muscat raisins) or golden-brown (Valencia raisins)."
- Vapor Iodi Etherealis, p. 1278, l. 19; for "0'05" read "0'05."
- \*Vinum Aurantii, p. 1282, l. 37; delete "Citratiss."
- \*Viola, p. 1288, l. 4; for "adōrata" read "adōrata."
- Yohimbina, p. 1290, l. 16; for "H." read "H."
- Metric Weights and Measures, p. 1306, l. 26; for "microlitre" read "microlitre."
- Percentage Equivalents, p. 1315, col. 6, l. 44; for "764" read "764"; p. 1318, col. 6, l. 4; for "764" read "764"; p. 1318, col. 6, l. 4; for "764" read "764."
- Index, p. 1321, col. 1, l. 1, for "54" read "547"; p. 1321, col. 1, l. 60; for "578" read "598"; p. 1330, col. 2, l. 49, for "73" read "703"; p. 1355, col. 2, l. 31, for "932" read "632"; p. 1358, col. 2, l. 4, for "667" read "467"; p. 1369, col. 2, l. 42, for "996" read "1196"; p. 1382, col. 1, l. 50, delete the entire line; p. 1386, col. 2, l. 32, for "578" read "598"; p. 1410, col. 2, l. 41, for "Salacetini" read "Salaceticici"; p. 1411, col. 2, l. 11, for "752" read "752."

## The Codex and the Medicine Stamp Act.

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The following extracts are copied from a letter, dated November 23, 1907, addressed to the Secretary of the Pharmaceutical Society of Great Britain, by Mr. E. E. Stoodley, Secretary to the Board of Inland Revenue :—

"I am directed by the Board of Inland Revenue to acquaint you that they have consented to recognise the 'British Pharmaceutical Codex' as a well-known book of reference in connection with the exemption from Medicine Stamp Duty in favour of 'known, admitted, and approved' remedies. The letters 'B.P.C.' printed on the label and enclosure of a preparation made according to a formula in the Codex will be accepted as an indication of the source from which the formula is taken.

"Medicines described in the 'British Pharmaceutical Codex' by names in the possessive case cannot be regarded as free from liability to duty by reason of their publication in the Codex, even if it be claimed that they are of a non-proprietary character. With regard to preparations of this nature in which an ostensible claim to a proprietary right is set up, the Board, before sanctioning their sale unstamped, require that the ostensible claim should be rebutted not merely by disclosure of the formula in a well-known book of reference, but also by the production to them of evidence that the article is in fact a well-known medicine the composition of which is familiar to chemists in general, and that the name included in the description never has carried with it any claim either to exclusive right of sale of the article or to exclusive knowledge in connection with its preparation.

"The only articles as to which the Board have as yet been satisfied on these points are Bland's Pills, Gregory's Powder, Liver Pills (Sir Andrew Clark), Hamilton's Pills, Christison's Pills, and Dobell's Aperient."

The foregoing list of names has since been augmented by the addition of the following : Easton's Syrup, Parrish's Syrup, and Stokes's Mixtures and Liniments. In the case of names such as Friar's Balsam, James's Fever Powder, Nisbet's Specific, St. John Long's Liniment, and Ward's Paste, it should be noted that they cannot be used without incurring liability to Medicine Stamp Duty.



## **B.P.C. SUPPLEMENT, 1908.**

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**Additional copies of this Supplement to the British Pharmaceutical Codex, 1907, can be obtained from the Publisher, 72, Great Russell Street London, W.C., at 1/- each post free.**

